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A FLORA OF MANILA

By

E. D. MERRILL

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BUREAU OF SCIENCE
MANILA

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PREFACE

There are definitely known from the Philippines at the present time about 6,500 species of flowering plants and vascular cryptogams, distributed into about 1,450 genera, in 200 families. Many of the species are of very local occurrence, while others are confined to medium and higher altitudes in the mountains, and are hence never seen by the average resident of the Archipelago. The flora of the coastal region, especially of the populated areas, is remarkably uniform, practically the same forms being found in and about such towns as Zamboanga, Cebu, Iloilo, Aparri, etc., as are found about Manila, so that for all practical purposes a flora of the vicinity of Manila is also a nearly complete flora for most inhabited regions at low altitudes in all parts of the Archipelago. Accordingly while most of the plants encountered in the settled areas at low altitudes will be found to be described in the present work, it will be found to be of little value for the determination of specimens collected in the forests and on the mountains.

In compiling this work an attempt has been made to include all the species of vascular cryptogams and flowering plants growing naturally within the area selected, as well as most of the cultivated forms, both of Philippine and of foreign origin. The area covered extends from a point north of Manila on the bay shore at Malabon, inland through Balintuac, San Francisco del Monte etc., to Pasig, thence to the town of Paranaque on the bay shore south of Manila, covering approximately 100 square kilometers (about 40 square miles). No part of the area exceeds an altitude of 50 meters, and no part of it approaches primeval conditions, the vegetation of the entire region having been profoundly altered by the presence of man.

This "Flora" is based on botanical material preserved in the herbarium of the Bureau of Science, supplemented by an extensive series of notes covering a period of exploration of the area extending over eighteen months. Undoubtedly future intensive exploration will add a considerable number of species to the list of indigenous ones, while the list of introduced and cultivated species is being very rapidly increased. Scattered individuals of any species found in neighboring provinces at low altitudes are to be expected within our area, and as a matter of fact a considerable number of species are included in the present work on the basis of single plants observed within the region covered by it. In early botanical works, various monographs etc., many Philippine species are credited to the Archipelago as having been collected in Manila; very many of these references are erroneous, the term Manila having been used more or less synonymously with the Philippines. Most of the species so referred to were collected in regions remote from the city, and very many of them on other islands than Luzon. No species has been included unless specimens have been seen from the area selected.

With few minor exceptions the arrangement adopted is that of Engler and Prantl's "Die Natürlichen Pflanzenfamilien," while the nomenclature is that of the Vienna Botanical Congress modified by the supplementary list of *nomina conservanda* adopted by the Brussels Botanical Congress. In addition to the accepted generic and specific name of each species, important synonyms have been added, as well as selected native, Spanish, and English names. Plate references have been added to the third edition of Blanco's "Flora de Filipinas," copies of which are to be found in most of the larger towns in the Archipelago. It has not been considered worth while to add literature references under each species.

The bibliography of Philippine botany is so extensive that it is impossible more than to mention the more important local works bearing on the subject. Blanco's "Flora de Filipinas," ed. 1 (1837), ed. 2 (1845), written in Spanish, is long out of print, and obsolete in arrangement and nomenclature; it contains the descriptions of about 1,150 species and varieties, very many of them so imperfectly described that their status has not as yet been determined with certainty. The sumptuous third edition of this work (1877–1883) is in six large folio volumes, the first three consisting of a reprint of the second edition with the addition of a Latin translation; the fourth volume consists of several additional papers of little value to the amateur in the determination of material, while the fifth and sixth consist of a series of 481 colored plates. Although many of these plates are erroneously named, still they are of great value in the determination of specimens, and references to them have been included in the present work. Of Vidal's publications the one of chief value is his "Sinopsis de familias y géneros de plantas leñosas de Filipinas" (1883), in which a great many woody plants are figured. The most important recent works on Philippine botany are to be found in the publications of the Bureau of Government Laboratories (1903–1905), the "Philippine Journal of Science, Botany" (1906–1912), published by the Bureau of Science, and Elmer's "Leaflets of Philippine Botany" (1906–1912). In the present work references are included to the above publications where individual groups have been treated systematically. For the determination of forest trees the most valuable publication is Whitford's "Forests of the Philippines,"[1] the second part of which contains a consideration of the most important timber trees found in the Archipelago with many illustrations.

Under each family the approximate number of genera and species for the entire world is given, and their general distribution, as well as the number of each definitely known from the Philippines. For each species both the Philippine and extra-Philippine range is given. Indigenous species are indicated by black faced type, while introduced or presumably introduced ones are indicated by light faced type; species introduced and cultivated only, not having become naturalized are indicated by an asterisk. The time of flowering as given for the individual species will apply only to the vicinity of Manila, or possibly also to other regions in the Archipelago having a similar annual distribution of rainfall; the flowering records are of necessity incomplete as it was found to be impossible to keep all the species under observation throughout an entire year.

No new species are described nor are any new combinations made, except in the case of a few varieties, in the present work. The few apparently undescribed forms encountered during the preparation of the manuscript, as well as the few new combinations made necessary by a strict interpretation of the accepted code of nomenclature, will be found in a paper entitled "Nomenclatural and Systematic Notes on the Flora of Manila,"[1] published previous to this work. A general consideration of the more striking characters of the flora, the introduced species and their origin, etc., will be found in the same publication.[2]

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[1] Forestry Bureau (Philip.) Bull. 10 (1911).

In the descriptions of families, genera, and species, the general sequence of characters as that adopted by Hooker in his "Flora of British India" has been followed. Many of the family and generic descriptions have been complied from that work, more or less modified to suit the character of the present publication; the descriptions of the species have been rewritten, partly from fresh material and partly from dried specimens, with reference to previously published descriptions in various standard works.

This publication contains the descriptions of 1007 species, 591 genera, and 136 families, nearly one-sixth of the species definitely known from the Archipelago at the present time. Most of these are the very commonest and most widely distributed ones in the Philippines, and form the characteristic vegetation of the settled areas at low altitudes in all parts of the Archipelago.

An examination of a number of recent elementary textbooks of botany has convinced me that it is impossible for the student to gain from them a sufficient knowledge of the technical names used in descriptive botany, properly to use a volume like the present one. For this reason it has been considered essential to include a short consideration of the terms more generally used in describing plants, in order to make the present work more complete in itself. The terms defined in the following pages will also be found in the Glossary of Technical Terms on page 25, together with many of the more unusual terms that are used to a greater or less extent in the following descriptions.

E. D. Merrill.

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[1] Philip. Journ. Sci. 7 (1912) Bot. 227–251.

[2] "Notes on the Flora of Manila, with Special Reference to the Introduced Element." *Philip. Journ. Sci.* 7 (1912) *Bot.* 145–208.

GENERAL CLASSIFICATION OF THE PLANT KINGDOM

I. Subkingdom — THALLOPHYTA — Plants not forming embryos.

- A. ALGAE — Phylum:
  - 1. Cyanophyta (Blue-green algae)
  - 2. Euglenophyta (Euglenoids)
  - 3. Chlorophyta (Green algae)
  - 4. Chrysophyta (Yellow-green algae, Golden-Brown algae and Diatoms)
  - 5. Phyrrophta (Cryptomonads and Dinoflagellates)
  - 6. Phacophyta (Brown algae)
  - 7. Rhodophyta (Red Algae)
- B. FUNGI — Phylum:
  - 8. Schizomycetes (Bacteria)
  - 9. Myxomycetes (Slime molds)
  - 10. Eumycetes (True fungi)
    - Class:
      - (a) Phycomycetes (Algal-like fungi)
      - (b) Ascomycetes (Sac fungi)
      - (c) Basidiomycetes (Basidium fungi)
      - (d) Deuteromycetes (Imperfect fungi)
      - (e) Lichens

II. Subkingdom — EMBRYOPHYTA — Plants forming embryos.

- Phylum:
  - 11. Bryophyta (or Atracheata) — Plants lacking conducting tissues.
    - Class:
      - (a) Musci — Mosses
      - (b) Hepaticae — Liverworts
      - (c) Anthocerotae — Hornworts
  - 12. Tracheophyta (or Tracheata) Plants with conducting tissues.
    - Suphylum:
      - (1) Psilopsida — leafless and rootless vascular plants, almost entirely extinct.
        Class: Psilophytinese — Psilotum
      - (2) Lycopsida — clubmosses and their relatives; with simple conducting system; leaves small, green.
        Class: Lycepodineae — Lycopodium
      - (3) Sphenopsida — Horsetail and their relatives; conducting system simple; stems jointed; leaves reduced, scale-like.
        Class: Equisitineae — Equisitum.
      - (4) Pteropsida — with complex conducting system; leaves large; with other advanced features.
        Class:
        - (a) Filicineae — True ferns
        - (b) Gymnospermae — Fines, Gycas, etc.
        - (c) Angiospermae — True flowering plants
          Subclass: a—Dicotyledoneae
          b—Monocotyledoneae

A FLORA OF MANILA

By E. D. Merrill

DEFINITIONS OF THE TERMS USED IN DESCRIPTIVE BOTANY

A work containing descriptions of the different kinds of plants growing in a country, or within some part of a country, properly arranged according to their relationships or assumed relationships is called a *flora.* The principal object of a *flora* is to enable the student or the individual interested in the study of the vegetation properly to determine the names of the various kinds of plants growing within the area treated by the work in question, and to gain some ideas of the range, abundance, and relationships of the various forms. In order to facilitate the naming of plants botanists have arranged the different kinds in groups according to the natural relationships of the different species, and botanical usage has established the values of numerous technical names used in describing plants. In the following pages an attempt has been made to define the more important and common terms used in descriptive botany; these, with additional less important ones, will also be found in the appended glossary.

THE PLANT.—According to their habit of growth plants are described as *trees* when they are erect, living from year to year, with a large development of woody tissue, having a single distinct stem or trunk, and reaching a height of 5 to 6 m or more. *Shrubs* are really small trees, and this term is frequently applied to tree-like plants less than 5 m in height, but by other authorities it is restricted to small, erect, woody plants which produce several trunks from the base; small shrubs less than a meter high are called *undershrubs,* but all intergrades occur between undershrubs, shrubs, and trees. *Herbs* are plants of various habit which contain but little woody tissue, and which, at least the parts above ground, persist for a year or less; they vary greatly in size. Plants that climb either by twining, by means of special organs for attachment, or by sprawling over other plants or objects are called *vines;* these may be either woody or herbaceous according to the development and permanence of the woody tissue. Some woody vines are frequently called *scandent shrubs,* especially when sprawling over other plants or objects, with no special adaptations for climbing.

Most plants are *terrestrial,* that is, growing on the earth and rooting in the soil; those that grow in water, either entirely or partly submerged, are called *aquatic;* those that grow on other plants may be either *epiphytes,* that is simply growing on the supporting plant but taking no nourishment from it, like most orchids, many ferns, mosses, etc., or *parasites,* when taking part or all of their nourishment from the host-plant, like

Cassytha, Loranthaceae, etc. Certain plants that grow on decaying organic matter and have no green tissue are called *saprophytes.*

Plants that live but a short time, a few weeks or months, and die after producing flowers and seeds are called *annual,* like many herbs; those that live for two years, producing flowers and seeds the second year and then dying, are called *biennial,* but these, although common in temperate countries, are rare in the tropics; those that live from year to year, like all trees and shrubs and many herbaceous plants with underground stems, are called *perennial.*

THE STEM.—The stem is the axis of the plant, to which are attached all other parts. In most plants the stems are very evident, but in some species they are entirely underground. Plants that show no obvious stem above ground, but bear only leaves and flower-stalks, are called *stemless* or *acaulescent.*

Stems above ground may be simple or branched. They are usually composed of *nodes,* the place on the stem or its branches where one or more leaves or branches are borne, and *internodes,* the spaces between the nodes.

Special kinds of stems or branches have received distinctive names, such as *culm,* the hollow or solid stems of the grasses with well-defined nodes and internodes; *sucker,* a branch arising from the stem or from roots underground or from adventitious buds on the trunk or larger branches of shrubs or trees, the latter being called stem-suckers; and *stolon,* a branch from above ground that becomes prostrate and strikes root at the tip or nodes, producing new plants.

As to differences in texture, stems are classified as *herbaceous* when living for a short period, forming no permanent woody tissue, and dying after flowering; *suffrutescent* when more or less woody or half-woody, at least at the base; and *woody* when forming permanent woody tissue lasting from year to year as in all shrubs and trees.

As to direction, stems are *erect* when they ascend perpendicularly from the base; *ascending* when rising obliquely; *decumbent* when more or less reclining on the ground at or near the base; *prostrate* when lying flat on the ground; *creeping* when closely appressed to the ground and rooting at the nodes; *climbing* or *scandent* when ascending by means of the support offered by other plants or objects, whether by *tendrils,* special spirally twisted organs, by rootlets, or by other means. Vines that climb by coiling about other stems or objects are called *twining.*

Underground stems assume various forms and are frequently confounded with roots. There are four principal kinds, the *rhizome* or *rootstock,* the *tuber,* the *corm,* and the *bulb.* The *rhizome* or *rootstock* is a more or less modified creeping stem growing beneath the surface of the soil; the simpler forms are slender and consist of nodes and internodes bearing scales, as in the mint (*yerba buena*), various perennial grasses, etc., but other forms are thick and fleshy, as in the ginger (*luya*). A *tuber* is a stout, thickened portion of a rootstock, bearing buds (eyes) on the sides, as in the potato, but intergrades occur between this and the preceding. A *corm* is a short, thick, fleshy, underground stem, usually sending off numerous roots from the lower part, and leaves and flowers-stalks from the upper, as in the taro (*gabi*). A *bulb* consists of a small basal solid part, its bulk being made up of thickened scales; those in which the scales closely enwrap each other are called *tunicated* bulbs, as in the onion, garlic, etc., and those where the scales are thick and narrow are called *scaly* bulbs.

As to the arrangement of branches and leaves, they are *opposite* when two are borne at the same node from opposite sides of the stem; *whorled* or *verticillate* when three or more are borne at the same node, arranged regularly around the stem; *fascicled* or *fasciculate* when two or more are borne at the same node on the same side of the stem; *alternate* when one is borne at each node on one side, and the next above or below on the opposite side of the stem; *distichous* when regularly arranged one above another in two opposite rows; and *secund* when all are turned toward one side.

THE LEAVES.—A typical complete leaf consists of the *blade* or *lamina,* the broad thin part of ordinary leaves, the *petiole* or leaf-stalk, and a pair of *stipules,* variously shaped appendages at the base of the leaf-stalk or at the nodes, which may be leaf-like, scale-like, or even represented by sheaths or by spines. Stipules are frequently wanting, such plants being then termed *exstipulate.* The end by which the leaf, or any other part of a plant is attached, is called the *base;* the opposite or free end, the *apex.*

The petiole or leaf-stalk is frequently wanting, the leaves being then called *sessile.* When the leaf-base clasps the stem it is called *amplexicaul* or *stem-clasping;* when the lobes meet around the stem so that the blade appears as though it were pierced by the stem, it is called *perfoliate;* when the edges of the leaf extend downward along the stem as ridges or wings it is called *decurrent;* when the base of the blade or the petiole forms a more or less closed vertical cylinder surrounding the stem, it is called *sheathing.*

When the leaves are inserted on a stem or branch, they are termed *cauline;* when they or the flowers are borne on the roots or rhizomes or very close to the base of the stem, they are termed *radical.* Radical leaves that spread in a circle on the ground forming a rosette are called *rosulate.*

Leaves are composed of a framework, consisting of ribs and veins, and of the softer tissue. When there is only one main vein much stronger than the others it is called the *midrib;* the primary divisions on each side are called the *lateral veins* or *nerves,* and the ultimate divisions the *veinlets,* or *nervules.* In cases where several equally strong veins radiate from the top of the petiole, they are termed *palmately,* or *digitately* nerved or veined, or in peltate leaves *radiately* nerved. In palmately nerved leaves, where the veins all start from the base, they are called *3-nerved, 5-nerved,* etc., according to the number of nerves, but when some start just above the base they are called *3-plinerved, 5-plinerved,* etc.

Venation is the term applied to the method of arrangement of the veins; there are two principal kinds, *parallel-veined* and *netted-veined* or *reticulate.* In *parallel-veined* leaves the whole frame work consists of slender ribs or veins that run parallel to each other, either from the base to the apex, or from the midrib to the margins, not dividing and subdividing and forming meshes. In *netted-veined* or *reticulate* leaves the veins branch and rebranch into finer and finer veinlets which unite with each other to form meshes; this network of veins is usually spoken of as the *reticulations.* Sometimes the nerves are so obscured by other tissues as not to be evident to the naked eye; in such cases the nerves are spoken of as *obsolete* or wanting.

As to the outlines of leaves, various terms have been selected to describe certain shapes. These terms are also used for any other flat parts of the plant, such as petals, sepals, some fruits, seeds, etc. Leaves are *linear* when they are narrow and several times longer than wide and of about the same width throughout, their margins nearly parallel; *lanceolate* when three or more times as long as wide, widest below and taper upward or both upward and downward, shaped more or less like a lance; *oblanceolate,* the reverse of lanceolate, broadest above the middle and tapering downward; *oblong* when two or three times as long as broad and not conspicuously narrowed, the sides nearly parallel; *elliptic* when shaped like an ellipse, equally rounded at both ends; *ovate* when twice or less as long as broad, widest below the middle and more or less narrowed upward; *obovate,* the reverse of ovate, widest above the middle and tapering downward; *oval,* somewhat like elliptic, but the breadth distinctly more than one half the length; *orbicular* when circular in outline; *spatulate* when narrow, more or less rounded above, and tapering from near the apex to the base; *cuneate* or *wedged-shaped* when broad above, tapering by nearly straight lines to the base; *falcate* when more or less curved; *flabellate* or *fan-shaped* when broad and rounded at the top, narrowed below like a fan; *reniform* when broader than long, shaped somewhat like a kidney. Various combinations like *oblong-ovate, oblong-lanceolate,* etc., are self explanatory, and are used to describe intermediate forms.

As to the tip or apex of the leaf, it may be *rounded* when broad and semicircular in outline; *truncate,* that is cut off square or nearly so; *acute* when ending in an acute angle with straight sides; *acuminate* when pointed, but the tapering lines incurved; *obtuse* when blunt or narrowly rounded; *retuse* when slightly notched at the apex; *emarginate,* more prominently notched; *obcordate,* that is inversely heart-shaped, an obovate leaf deeply notched at the apex; *cuspidate,* tipped with a sharp point; *mucronate* when abruptly tipped by a small short point; and *aristate* when the mucronate point is extended into a longer and more or less bristle-like appendage. Some of these terms are also applicable to the base of the leaf, and most or all of them to various other organs of the plant.

As to the base of the leaf, it may be *cordate* or *heart-shaped* when the outline of its rounded base is turned in forming a *sinus* where the petiole is attached; *auricled,* that is *eared,* having a pair of small projections at the base; *sagittate* or *arrow-shaped* where the ears or lobes are acute and turned downwards; and *hastate* where the basal lobes are acute and point outwards. A leaf is *peltate* or *shield-shaped* when the petiole is attached to the lower surface, the ribs or veins of the leaf radiating from the point of insertion.

Leaves are *simple* when the blade is of a single piece, without regard to how much it may be cut up, and *compound* when the blade consists of two or more separate parts on a common petiole. In compound leaves the individual parts of the leaf-blade are called *leaflets* and their stalks the *petiolules;* the extension of the petiole above the lowest leaflets in many compound leaves is called the *rachis.* Some compound leaves have their leaflets or petiolules subtended by variously shaped, usually small, appendages corresponding to the stipules of the leaves; these appendages are called *stipels;* leaflets are called *stipellate* when these organs are present and *exstipellate* when they are absent, the words corresponding to stipulate and exstipulate as applied to the entire leaf.

Simple leaves as to their margins may be *entire* when the margin is a continuous even line, without teeth or notches; *serrate* when cut into sharp teeth pointing forward like the teeth of a saw; *dentate* or simply *toothed* when the teeth are sharp and point outward, not forward; *denticulate,* diminutive of dentate; *crenate* when the teeth are rounded; *crenulate,* diminutive of crenate; *repand* or *undulate* when the margin forms a wavy line bending gently inward and outward; *sinuate* when the margin is strongly undulate; *incised* or *cut* when cut into deep, sharp, irregular teeth; *lobed* when deeply cut, but the incisions do not reach much more than half-way to the midrib; *cleft,* nearly the same as lobed, but the incisions extending more than half-way to the midrib; *parted* when the divisions extend nearly to the midrib; and *divided* when they extend quite to it. According to the number of lobes, clefts, etc., leaves may be *3-lobed, 5-cleft, many-cleft,* etc.

In simple leaves the method of division corresponds to the venation; in pinnately-veined leaves the incisions all point toward the midrib, and in palmately veined ones they point toward the apex of the petiole.

According to the degree of division we may have in pinnately veined leaves, *pinnately-lobed, pinnately-cleft,* or *pinnatifid, pinnately-parted,* and *pinnately-divided* or *pinnatisect* leaves, and in palmately veined leaves the same combinations, with *palmately* substituted for pinnately.

The number of the lobes or divisions is frequently used, and we may have *palmately 3-lobed, -3-cleft* or *trifid, -3-parted* leaves, etc., and with higher numbers *palmately 5-lobed, -many-lobed, -many-cleft* or *multifid,* etc. The same combinations are made with the substitution of *pinnate* for palmate.

In compound leaves the separate parts, corresponding to the lobes, divisions, etc., of simple leaves, are called *leaflets.* There are two principal kinds, corresponding to the principal kinds of division in simple leaves, *pinnately compound* and *palmately compound.*

Pinnate leaves are those where the leaflets are attached along the sides of a main stalk or *rachis,* the leaflets corresponding to the lobes of a simple, pinnately lobed leaf. When there is an odd or end leaflet, such leaves are termed *uneven pinnate, odd-pinnate,* or *imparipinnate;* when there is no odd terminal leaflet they are termed *evenly* or *abruptly pinnate.* Simple *pinnate* leaves are those with a double row of leaflets; *twice pinnate* or *2-pinnate* leaves are those where the rachis bears branches, the branches bearing the leaves, in which cases the branches are termed *pinnae;* the division may be carried still further and we may have *3-* or *tripinnate, 4-* or *quadripinnate* or *pinnately decompound* leaves, etc.

In palmately compound leaves we may have the division carried further in *twice palmate,* or when the division is in three's, *twice ternate* or *biternate;* if the division goes still further it is called *palmately decompound.*

As to the number of leaflets they may be few to many; when only one, as in the orange, the leaves are called *1-foliolate,* or *unifoliolate;* when 2, *2-foliolate,* or *bifoliolate;* when 3, *3-foliolate,* or *trifoliolate,* etc., and these terms are used with both pinnately and palmately compound leaves, such as *pinnately 5-foliolate, palmately trifoliolate,* etc. In pinnate leaves the terms *2-* or *bijugate, 3-* or *trijugate, multijugate,* (*juga*=pairs) etc., are used to express the number of pairs of leaflets, pinnae, etc.

Special forms of leaves not included in the above definitions are the following: *Equitant* when the leaves are vertical, each overlapping the next beneath as if they were folded together lengthwise; *cylindric* when with no definition between blade and petiole, and cylinder-shaped; and *acicular* when very slender and sharp, like needles.

Sometimes the leaves are reduced to mere scales, and in the axils of the scales are borne green, variously shaped branchlets which have the functions and appearance of leaves, as in *Asparagus;* these special branchlets are called *cladophylls* or *cladodes.*

Solid, not flat parts of plants, such as fruits, some stems, some fleshy leaves, seeds, etc., are described by special terms, such as *ovoid,* that is, egg-shaped, with the narrow end upward, and *obovoid,* egg-shaped, with the broad end upward, corresponding to *ovate* and *obovate* in flat surfaces; *globose* or *spherical,* shaped like a ball, corresponding to *orbicular* in flat surfaces; *ellipsoid* when a vertical section shows an ellipse; *turbinate* when shaped like a top; *conical* when equally tapering upward, and *obconical* when tapering downward, in both cases showing a circle in cross-section; *pyramidal* and *obpyramidal* corresponding to conical and obconical, but showing square or polygon in cross-section; *fusiform* when round and tapering at both ends; *terete* when the transverse section is a circle; *trigonous* or *triquetrous* when 3-angled in cross-section; *compressed* when more or less flattened laterally; *depressed* when flattened vertically; *articulate* or *jointed,* if at any period they separate into 2 or more parts placed end to end.

As to consistence, leaves (and other parts as well) may be *fleshy* when thick and soft; *succulent,* with about the same meaning but with rather more juice; *coriaceous* when firm or tough like leather; *chartaceous* when paper-like in texture; and *membranaceous* when thin and more or less flexible.

Surfaces of leaves, stems, fruits, and other parts of the plant are described as *glabrous* if entirely smooth, without hairs or projections of any kind; *rugose* when wrinkled or marked with irregular raised and depressed lines; *striate* when marked with parallel lines, *scabrid* when roughened by small projections; *tuberculate* when covered with small wart-like projections; *muricate* when the protuberances are hard and pointed; and *echinate* when they are stiffer and longer, almost awn-like.

The indumentum or covering of leaves and other organs is various, the principle forms being: *Pubescent* when rather softly hairy; *puberulent* when the hairs are very short and soft; *pilose* when the hairs are long and soft; *hirsute* when the hairs are stiff and spreading; *hispid* when the hairs are still stiffer; *strigose* when the hairs are short and stiff and are closely appressed to the surface, all pointing in one direction; *tomentose, woolly,* or *lanate* when the hairs are soft and more or less matted together; *canescent* when the hairs are grayish and not distinct to the naked eye; *mealy* or *farinose* when the indumentum is of very short hairs with the appearance of meal, readily rubbing off; *glaucous* when pale-bluish, often with a waxy bloom, and *furfuraceous* when covered with small, spreading scales.

Hairs may be *simple* or *branched;* if the branches are radiately arranged, they are called *stellate;* if like a feather, in two ranks, they are called *plumose.* Besides hairs, leaves and other organs may be more or less covered with small waxy glands, and are described as *glandular,* or with minute rounded, appressed scales, being then described as *lepidote.*

The term *gland* is applied not only to the small, waxy, shining, usually colored, dots found on leaves, etc., but also to the variously shaped, wart-like or shield-like bodies found on petioles, pedicels, petals, sepals, etc.; to small translucent vescicles in the leaves, petals, etc., filled with oil, usually readily seen with transmitted light; and to lobes of the disk or other excrescences in the flower.

THE INFLORESCENCE.—By the *inflorescence*, we mean the flowers and their arrangement on the plant. Flowers may be solitary or variously grouped. When a single flower or group of flowers terminates a branch it is called *terminal;* when borne in the axils of the leaves, *axillary;* when borne on the internodes between the nodes or axils, *extra-axillary;* when borne opposite a leaf, *leaf-opposed;* when borne on the stem below the leaves, *cauline;* and when borne on the root, *radical.*

Solitary flowers may be *sessile* when seated on the axil or other support without any supporting stalk, or *pedicelled* when supplied with a stalk or *pedicel.* A stalk that bears a cluster of flowers is called a *peduncle,* and the individual stalks of the flowers are called *pedicels.*

There are numerous forms of inflorescences, and these have received special names. A *spike* or *spicate* inflorescence is that kind where the flowers are sessile along a simple undivided axis or rachis; a *raceme* or *racemose* inflorescence is similar to a spike, but the flowers are pedicelled; a *panicle* or *paniculate* inflorescence is where the axis or rachis is divided regularly into branches which bear two or more flowers, and is usually more or less open; an *umbel* or *umbellate* inflorescence is where the flowers are pedicelled and all spring from the apex of the peduncle, the branches arranged like the ribs of an umbrella; a *head* or *capitate* inflorescence is where the flowers are sessile and crowded in a dense globose mass; a *corymb* or *corymbose* inflorescence is where the branches and pedicels, although starting from different points, all attain the same level, the lower branches and pedicels being longer than the upper ones, the inflorescence having a flat or nearly flat top, the outer flowers opening first; a *cyme* or *cymose* inflorescence is similar to a corymb, but the inner flowers open first; a *fascicle* is where the flowers are sessile or pedicelled and crowded, usually axillary; a *catkin* or *ament* is a short or long, usually dense, scaly spike; a *spadix* is a dry or fleshy spike with small flowers, the whole commonly surrounded by an enveloping organ called the *spathe,* as in the taro (*gabi*) and the *Araceae* in general.

Flowers and inflorescences are frequently supplied with small or large, often leaf-like organs, known as *bracts* and *bracteoles.* In general *bracts,* when present, are found under each branch and branchlet of the inflorescence, while *bracteoles* are borne on or at the base of the pedicels of the flowers. When several bracts are collected in a whorl, that is, spreading radiately from a single node, loosely or closely enveloping an inflorescence or a flower, they are collectively called the *involucre. Glumes* are the usually dry bracts enclosing the flowers in the grasses and sedges. *Paleae* are the inner chaff-like scales in the heads of certain *Compositae,* the inner scales of grasses, the scales on the rootstocks and stipes of ferns, etc.

THE FLOWER.—A complete flower consists of four sets of organs, the two outer rows or whorls, known as the floral envelopes, consisting of the *calyx* and the *corolla* and collectively known as the *perianth,* and two inner rows or whorls, the essential organs, consisting of the *stamens* and *pistils.* The axis of a flower, or that part on which the various organs are inserted is called the *receptacle.*

The outer row or whorl is known as the *calyx,* and is commonly green, firmer in texture, and smaller than the next inner row; the individual parts are called *sepals.* The next inner row or whorl is known as the *corolla,* which is commonly larger than the calyx, of thinner texture, and frequently white or variously colored; the individual parts are called *petals.* Certain flowers in cultivated plants consist wholly of floral envelopes, and these are known as *double flowers,* as in the rose, some cultivated species of *Hibiscus* (*gomamela*), etc.

The next inner whorl consists of the *stamens,* or male organs. A typical *stamen* consists of two parts, a stalk, known as the *filament,* which bears a variously shaped body filled with a fine, yellow, dust-like substance, the *pollen,* this body being called the *anther.*

The innermost row or whorl, frequently a single body, is the *pistil,* or female organ, which, when complete, consists of three parts, the *ovary, style,* and *stigma;* a simple pistil is called a *carpel.* The *ovary* is the basal, usually enlarged and hollow part, which contains one or more *ovules* or rudimentary seeds; an ovary may be from 1- to many-celled. The *style* is the usually tapering part above the ovary. The *stigma* is a variously shaped, often small, usually apical part of the style with a moist surface to which the pollen may adhere.

As noted above a *complete* flower is one in which all four of the above sets of organs are present. In very many flowers from one to three of the sets of organs are absent, such flowers being *incomplete.* A *perfect, bisexual,* or *hermaphrodite* flower is one in which the two sets of essential organs, stamens and pistils, are present and fully developed, although the perianth may be present or absent; an *imperfect* or *unisexual* flower is one in which either the stamens or the pistils are imperfect or wanting. Flowers with stamens and no or only rudimentary pistils are called *staminate* or *male,* and those with pistils and no or only rudimentary stamens are called *pistillate* or *female.*

Unisexual or *imperfect* flowers are said to be *monoecious* when both male and female flowers are produced by the same individual, as in *Ricinus communis* (*tangan-tangan*); *dioecious* when male flowers are borne on one plant and female flowers on another as in *Antidesma* (*bignay*); and *polygamous* when some flowers are perfect, and some male or female on the same plant.

Incomplete flowers are said to be *naked* when they have neither calyx nor corolla, and *apetalous* when the corolla is absent. When there is but one set of floral envelopes present it is always considered to be the calyx.

Flowers are *regular,* when all the parts of each set of organs are of like size and shape; *irregular,* when some parts of one or more sets of organs differ from other parts of the same set either in shape or size, or both.

A *symmetrical* flower is one in which the parts of all sets of organs are the same in number or in multiples of the prevailing number; an *unsymmetrical* flower is one in which there is a variation from the standard number in one or more sets of organs.

In the use of numerals in describing the parts of flowers they are termed *3-merous* or *trimerous,* when the parts are in threes, *5-merous* or *pentamerous* when the parts are in fives, etc. Plants with 1, 2, 3, or many stamens, are described as *monandrous, diandrous, triandrous, polyandrous,* etc.; if with 1, 2, 3, or many petals, as *monopetalous, dipetalous, tripetalous, polypetalous,* etc.

By the union of parts flowers are variously modified. The term *connate* is used to express union of parts of the same set of organs, and *adnate* when organs of one set are more or less united with those of another set.

As to the perianth and its parts, when the sepals are more or less united the calyx is described as *gamosepalous*, and when they are quite free from each other, as *polysepalous*, or *chorisepalous;* with the corolla when the parts are united it is described as *gamopetalous* or *sympetalous*, and when the petals are quite free from each other as *polypetalous* or *choripetalous*.

THE COROLLA.—As to shape the corolla varies greatly in different species necessitating various names to describe the many forms. Among these special names are *tubular*, when elongated and shaped like a tube or cylinder; *funnel-shaped*, when gradually spreading from near the base to the apex; *campanulate* when the tube is broad and rather short, widening upward like a bell; *salver-shaped* when the lower part is cylindric and the upper part or limb spreads horizontally; *urceolate* when the tube is ovoid or globose, contracted above into a short neck and again expanded in a narrow limb like an urn; and *rotate* or *stellate* when the lobes spread radiately from near the base like a wheel or star.

A gamopetalous corolla usually shows differently shaped parts, the contracted part below called the *tube*, the spreading part above called the *limb*, and the junction of the two, called the *throat*.

Irregular flowers may be *papilionaceous* as in the flowers of various beans, consisting of a large upper and outer petal, the *standard* or *vexillum*, two lateral petals usually much smaller than the standard and very different in shape called the *wings*, and the *keel*, consisting of the two lower and usually smaller petals, often slightly connate and somewhat resembling the prow of a boat. Another type is the *labiate* corolla, in which it is more or less 2-lipped, the two upper lobes more or less uniting to form the upper lip, the three lower ones to form the lower lip. The *ligulate* or *strap-shaped* corolla is found in some of the *Compositae*, the base being a short tube, opening out into an elongated narrow, flat, strap-like appendage.

The arrangement of the petals and sepals in the bud is important; they are *valvate* when their edges touch each other but do not overlap, and *imbricate* when to a greater or less degree they overlap. They are *plicate* when folded in longitudinal plaits.

Some petals are distinctly stalked, and special terms are used to indicate the different parts; the stalk is called the *claw*, and the broad part the *lamina*.

THE STAMENS.—In a few cases the stamens pass by gradual intergradations into the petals but usually they are very distinct. The principal parts of the stamen are the *filament* and *anther* described above. Collectively the stamens form the *androecium*.

Stamens are most generally quite free from each other, or *distinct*, or they may be variously united. When united by their filaments in a single cluster they are called *monadelphous;* when in two clusters *diadelphous;* when in three clusters *triadelphous*, etc. When the anthers are united and the filaments are free, they are called *syngenesious*. In some cases the filaments are entirely united, forming a globose or cylindric tube, known as the *staminal tube*, bearing the anthers either on the inside or at its apex. Stamens are said to be *exserted* when they extend beyond the perianth.

As to their place of attachment stamens are *epipetalous* when inserted on the corolla; *hypogynous* when inserted on the receptacle; *perigynous* when inserted on the calyx; and *epigynous* when apparently borne on the ovary.

The *anther* is the essential part of the stamen. The filament is frequently wanting, the anther then being described as *sessile.* As to its attachment it is *adnate* when attached by its base, and *versatile* when attached by a point near the middle. When it faces inward it is called *introrse,* and when outward it is called *extrorse.* The anther usually consists of two cells, but some have 1, 3, or 4. The filament is frequently prolonged between the cells, this prolongation being called the *connective.* The cells open to allow the escape of the pollen by longitudinal slits, by valves, or by pores. Imperfect stamens are called *staminodes.*

THE PISTIL.—As *androecium* is a general term to include the entire male organs, so *gynaecium* is a term used to include all the female organs. The principal parts of the pistil are the *ovary, style,* and *stigma* as described above (p. 16). The ovary is the essential part as it contains the rudimentary seeds or *ovules;* the style is frequently wanting, the stigma then being described as *sessile.*

If the floral organs appear as though they were inserted on the top of the ovary, the latter is then described as *inferior;* if the ovary is inserted on the receptacle, and free from the other floral organs it is described as *superior;* intergradations occur and we may have a *half-inferior,* or *half-superior* ovary. When the ovary is superior the calyx is often described as *inferior,* and when the ovary is inferior the calyx is spoken of as *superior.*

A pistil may be simple or compound. A *simple pistil* is one with a 1-celled ovary bearing a single ovule or row of ovules. A *compound pistil* or *syncarpous ovary* is one in which two or more carpels are more or less united forming one body. It may be 1- to many-celled.

The surface on which the ovules are borne is called the *placenta;* this may be *basal,* when situated at the bottom of cell; *parietal* when situated on the wall; or *axile* when the ovules are attached to the center or axis in several-celled ovaries.

In most flowering plants the ovules are enclosed in the ovary, these plants being known as the *Angiospermae* or angiosperms, but in one group the ovules are naked, this group being known as the *Gymnospermae* or gymnosperms.

In regard to their direction ovules are *erect* when rising upright from the base of the cell; *pendulous* when hanging from the side or near the top; *suspended* when hanging from the apex of the cell; and *horizontal* when directed neither up nor down.

In their development they are *orthotropous* or *straight* when they do not curve or turn; *campylotropous* or *incurved* when by greater growth on one side they become kidney-shaped, bringing the orifice down near the base; *amphitropous* when the ovule is apparently attached laterally; and *anatropous* when it has continued adnate to its stock which remains straight, the ovule becoming entirely inverted.

THE FRUIT.—The *fruit* consists of the matured ovary and frequently other usually enlarged and variously altered parts of the flower, that persist until the seeds are ripe. They may be *simple,* those resulting from the ripening of a single ovary, or *aggregate,* when several to many carpels of a single flower in development become crowded into a mass, as in anona (*ates*, etc.). A *collective* fruit is one formed of the carpels of several to many flowers united into a mass as in the jak fruit (*lanca*). The wall of a fruit is called the *pericarp*, and when the several layers are distinct, the innermost layer is called the *endocarp*. the outermost layer the *exocarp*, and the intermediate layer the *mesocarp*.

Fruits that open at maturity are called *dehiscent*, while those that remain closed are called *indehiscent*.

As to texture, fruits are described as *succulent* or *fleshy* when soft and juicy throughout, and *dry*, when they contain no pulp. All intergrades occur.

The principal kinds of fruits that have received distinctive names are the *berry*, or *baccate* fruit, the whole pulp soft and fleshy with few to many seeds imbedded in the pulp; the *drupe*, the outer part more or less soft and fleshy, the inner part hard and stone-like; the *achene*, a small, dry, indehiscent, one-seeded, seed-like fruit, like those of the *Compositae; utricle*, similar to an achene but the pericarp loose and bladder-like, ultimately dehiscent; *caryopsis* or *grain*, like the fruits of grasses, the seeds adhering to the thin pericarp throughout; *nut* a dry, hard, indehiscent fruit; the *legume* or *pod*, consisting of a 1-celled fruit splitting regularly into two valves generally by both sutures, as in many *Leguminosae*, or often indehiscent; follicle, the fruit of a single carpel dehiscing by the ventral suture; *capsule* the dry, dehiscent or indehiscent fruit of a compound ovary. In dehiscent fruits the cells open chiefly in one or two ways; if splitting through the dorsal suture directly into each cell it is called *loculicidal;* if splitting through the partitions it is called *septicidal*. Those that open by a circular lid at the apex are called *circumsciss*.

Other forms of fruits are such as the *cone*, a multiple fruit consisting chiefly of overlapping appressed scales, each scale bearing one or two seeds on its inner face; the *pepo*, represented by the squash (*calabaza*), which is really a kind of berry; the *hesperidium*, such as the orange, really a berry with a thick skin; the *pome* such as the apple, in which the bulk is made up chiefly of the much-thickened calyx, etc.

Some fruits are variously appendaged, chiefly for purposes of distribution. They may be covered with hooked or barbed bristles or with viscid glands, or supplied with flattened appendages called *wings*, or with tufts of long or short hairs, called the *coma*, as in many *Compositae*, etc.

THE SEED.—The seed is the fertilized and developed ovule, and is exceedingly variable in size and shape, from the minute and almost dust-like seeds of the orchids, to the very large seed of the coconut.

The seed-coats usually consist of two layers, an outer thicker one known as the *testa*, and an inner more delicate one known as the *tegmen*. The scar where the seed was attached is called the *hilum*.

Externally seeds may be smooth, pitted, wrinkled, or marked in various other ways, hairy as in the cotton, winged, or supplied with a tuft of hairs called a *coma*. Various appendages have received special names, such as the prominent wart-like growth at the hilum in such seeds as *Ricinus* (*tangan-tangan*) known as the *caruncle;* an often fleshy, colored, entire or variously divided appendage that in part or entirely encloses some seeds is called the *aril*, seeds supplied with this organ being called *arillate*.

In the fully developed embryo the most prominent part is the seed-leaves, known as the *cotyledons*. In accordance with the number of these the largest group of flowering plants is subdivided into two great divisions, the *monocotyledons*, if one cotyledon be present, and the *dicotyledons*, if two be present. When the embryo proper contains its own store of plant food, the seed is called *exalbuminous*, but when the plant food is stored outside of the embryo the seed is called *albuminous*, and the food-deposit is called the *endosperm*. In descriptive botany the endosperm is described as *mealy* when granular like meal, *horny* when hard and bone-like, *continuous* when smooth and uninterrupted, and *ruminated* when penetrated with irregular depressions, as if chewed, as in the betel nut (*bunga*).

CLASSIFICATION

Recent estimates show that there are at present known in all groups of plants about 235,000 different kinds or species, hence it is evident that some kind of systematic classification is necessary to indicate the relationships of this enormous number of forms. For convenience botanists have classified plants according to their relationships or assumed relationships into species, genera, families, orders, etc., all finally being included under the comprehensive term Vegetable Kingdom.

A *species* comprises all the individuals that so closely resemble each other that we may conclude that they have all been descended from a common parent, from few to many generations back. Specific identity is inferred when different specimens closely resemble each other in all essential characters, for no two individuals are exactly alike, there always being a tendency to variation; under species some botanists recognize *subspecies*, *varieties*, and *forms*, but it is frequently if not always a matter of personal opinion whether any constant character or set of characters by which one plant differs from other allied ones, constitutes a specific difference, or whether the differences should be considered only as the basis of a subspecies, a variety, or a form.

To facilitate classification a number of species having certain characters in common, are grouped in a *genus;* the generic name corresponding to a person's family name, and the specific name to his given one; a genus may consist of a single species, or of any number up to several hundred. Genera are frequently subdivided into subgenera or sections, or both.

Genera still being far too numerous properly to study without other arrangement, have been grouped into families, each family having its distinctive name; for instance, the *Palmae* or palm family form a very natural group, the limits of which are evident even to non-botanical observers; the grasses form another equally well-marked family, the sedges another, etc. Families may contain few to many genera, and are frequently divided into subfamilies and tribes, or they may consist of a single genus with but few, or sometimes only a single species.

Families themselves, of which about 285 are now generally recognized in the flowering plants, are again arranged in *orders;* the grasses and sedges, for example, being two distinct families but with certain characters in common that are not found in other groups, are hence classified in the natural order *Glumales* or *Glumiflorae*. Orders are arranged in Classes, the Order *Glumales* falling in the Class *Monocotyledoneae* with many others, that is, plants which produce seeds with but a single cotyledon. Again Classes are grouped in Divisions, the Class *Monocotyledoneae* forming a Subdivision of the *Angiospermae*, that is, plants with ovules borne in closed ovaries, of the Division *Spermatophyta*, that is, all plants that produce seeds. The Vegetable Kingdom is made up of four Divisions.

So far as the following "Flora" is concerned but the two higher divisions of the Vegetable Kingdom are considered, III *Pteridophyta*, the ferns and fern-like plants, often called the vascular cryptogams, and IV *Spermatophyta*, the seed-producing or flowering plants, often called the *Phanerogamia* or phanerogams; the first division consisting of the fungi and algae, and the second consisting of the mosses and scale-mosses are not included in this work. Orders are not indicated.

The following is the general scheme of classification of the groups considered in the following paper:

Division III. **PTERIDOPHYTA**; ferns and fern-like plants.
  Class 1. **Filicales**; the true ferns (four families in our area).
  Class 2. **Equisetales**; the horse-tails (no representatives in our area).
  Class 3. **Lycopodiales**; the club-mosses (two families in our area).
Division IV. **SPERMATOPHYTA**; the flowering and seed-producing plants.
  Subdivision I. **Gymnospermae**; plants with naked ovules; stigmas none (one family in our area, *Cycadaceae*).
  Subdivision II. **Angiospermae**; plants with ovules in closed ovaries; stigmas always present.
    Class 1. MONOCOTYLEDONEAE; plants producing seeds with a single cotyledon, eleven Orders (twenty-six families in our area).
    Class 2. DICOTYLEDONEAE; plants producing seeds with two cotyledons, thirty-six Orders (one hundred and three families in our area).

To illustrate the above scheme of classification, the common bamboo known locally as *cauayan* or *cauayan totoo*, is known to botanists as *Bambusa blumeana* Schultes, the first name being its generic, the second its specific one, while the third is the name of the botanist who described the species. It belongs to the tribe *Bambuseae* in the Grass Family, or *Gramineae*, of the Order *Glumales*, Class *Monocotyledoneae* (seeds with one cotyledon), Subdivision *Angiospermae* (ovules in closed ovaries), of the Division *Spermatophyta* (plants producing seeds). The determination of a plant in practice usually means tracing it to its proper family, genus, and species. To facilitate the identification of specimens artificial keys to the families have been devised, while under the families keys to the genera, and under the genera keys to the species will be found.

THE PREPARATION OF BOTANICAL SPECIMENS

The number of different species is so great that for purposes of study and comparison it is necessary to preserve material in a convenient form, hence various methods have been evolved for drying, mounting, and arranging botanical specimens.

A botanical specimen of an herbaceous plant, to be complete, should consist of roots, stems, leaves, buds, flowers, and mature fruit. It is frequently impossible to gather all of these at any one time, and accordingly later gatherings are often necessary. In the case of small herbaceous species frequently everything can be shown by entire plants, but with coarse ones it is usually convenient or possible to prepare sections only. In the case of woody plants it is unnecessary to secure specimens of the roots, but many collectors prepare thin sections showing the bark and wood.

Specimens should not exceed 40 cm in length, and if longer than this, as is very frequently the case, the stems can be folded back and forth or cut into sections. In such plants as the grasses and sedges tall specimens can be folded back and forth like the letter N, or folded several times if necessary, and a piece of tough paper, slit and slipped over the folded ends, will hold the specimen in position while drying. In species with very large leaves frequently it becomes necessary to take sections only. In large pinnate leaves all the pinnae on one side can be removed and the remaining part of the leaf folded together for drying; in very large leaves such as the palms, etc., portions only can be prepared, but full notes should be taken as to size, number of pinnae, lobes, etc. Large fruits can be dried separately, and fleshy fruits can be sectioned or preserved in alcohol or in some other preservative. Thick fleshy roots can also be sectioned and thick stems can be sliced longitudinally. Often it is advisable to dry separately fleshy or large fruits, tubers, etc., but as soon as dried, such detached parts should be placed with the rest of the specimen for permanent preservation.

In collecting specimens the most convenient method of transporting them is in a portfolio, spreading the plants out on sheets of thin paper. The most serviceable portfolio is a pair of simple frames made of split bamboo similar to and of about the size as the presses, described below, that is, slightly larger than the botanical driers; this double frame can be supplied with straps for convenience in opening and closing, and for purposes of transportation. In wet weather it is also advisable to have a piece of black oil cloth, such as is used for covering the tops of carriages, or a piece of cotton cloth dipped in melted parafin, sufficiently large to protect the enclosed papers and specimens in the portfolio from being wet by rain, etc. In practice it will be found that specimens can be transported from one to two days in such a portfolio, before transferring them to the press, without, in most cases, being seriously harmed; as a rule however, specimens should be arranged in the press as soon as possible after they are collected.

To dry specimens the selected plants or parts of plants are laid out flat, in as nearly a natural position as may be, between sheets of soft, unsized, porous paper and subjected to considerable pressure. The object is to extract the moisture as rapidly as possible, at the same time keeping the specimens flat and under sufficient pressure to prevent their wrinkling, but at the same time not sufficient to crush the more delicate parts. The papers must be changed at intervals.

In the Philippines the most generally available soft paper is the common Chinese bamboo paper that can be secured of Chinese dealers in most large towns; this makes excellent driers, especially if stitched into pads of about 4 thicknesses. Blotting paper makes excellent driers, and even old newspapers can be utilized. Driers should be cut or folded into a size not to exceed 45 by 30 cm, and if this is done then there will be no danger of making specimens too large to be mounted on standard herbarium sheets.

In preparing specimens for drying lay the selected plants on a single sheet, or between the folds of a double sheet of thin paper, the specimen sheet, then add one or more driers, then another specimen sheet, other driers, etc.; old newspapers make excellent specimen sheets. When all the specimens are arranged or the stack gets too high for convenience, the whole should be placed under pressure, usually from 20 to 30 kilos being sufficient.

The most convenient method of applying pressure is by means of a press which is best made of split bamboo, either nailed together or fastened by rattan, wire, or string; the cross-slats should not be more than 3 or 4 cm apart. The press frames should be a little larger than the sheets used for driers, a convenient size being 50 by 35 cm. Pressure can be applied by straps, or better by means of stout cords attached to each corner of the lower frame, to be fastened to the corners of the upper frame as pressure is applied. Presses are not essential as pressure can be applied by other means. The driers with specimens to be dried can be stacked in piles up to 60 cm or so in height, and a board placed on the stack, pressure being applied by means of stones or other weights.

Presses containing drying plants should, so far as possible, be kept in the sun in a breezy place during the day but should be placed under cover at night and in damp or rainy weather; during the rainy season, or during protracted rains they should be placed near or over a fire.

As a rule the oftener the driers are changed, the better, and this should be done at least once each day, otherwise the specimens are apt to discolor badly, become mouldy, or even decay. In changing driers remove the specimen sheet with the enclosed plant or plants to fresh driers *without disturbing the drying plant itself.* The damp papers (driers) should be thoroughly dried before using again, either by spreading them in a sunny place or drying them by fire. Better results will be secured by replacing the damp driers with warm or hot dry ones.

Extra flowers, and especially very delicate ones should be placed in packets of thin paper in drying, and parts that become detached in drying such as flowers, fruits, etc., should also be so treated.

The length of time necessary properly to dry specimens varies very greatly, some species such as slender grasses and sedges, most ferns, etc., drying well in from one to three or four days according to the number of times the driers are changed, and whether or not artificial heat is used, etc. Other species are more slow in drying, and some succulent plants, like most orchids, dry very slowly. In such cases it is advisable first to kill the plant by plunging it in boiling water for a moment, being careful, however not to immerse the flowers; the plant thus killed will dry much quicker than if not so treated.

When the specimens are thoroughly dried they can be removed from the press and stored in well wrapped bundles until desired for study or for other purposes. To protect the dried specimens against the depredations of small insects it is almost essential in this country that a small amount of naphthalin or some similar repellant be sprinkled over the specimens.

Notes on specimens to be preserved should be as full as circumstances permit. To be complete they should show the locality, habitat, altitude, date of collection and collector, size of the plant, if not shown by the specimen itself, habit of growth, color of the flowers and its parts, odor if any, color and any particular characters of the fruit that would be destroyed in drying, local name, economic uses; in short all data that are not shown by the dried specimen itself. The label bearing these data should be attached to the specimen or preserved with it.

THE HERBARIUM

A collection of dried plants is called an herbarium, and such a collection is most essential in the study of taxonomy or systematic botany.

For convenience in referring to specimens, the dried plants are commonly mounted on sheets of fairly stiff white paper, the usual size, known as the standard herbarium sheet, being 29 by 42 cm. Any paper of good quality and fairly stiff can be used, but about 60-pound linen ledger paper is best adapted to all purposes.

There are several methods of mounting specimens, the chief being a combination of gumming and strapping, or strapping alone. Ordinary glue, fish-glue, or mucilage, can be used in fastening specimens to the herbarium sheets, but the most satisfactory adhesive is gum arabic dissolved in cold water to the consistency of ordinary mucilage; to this mixture a small amount of carbolic acid should be added to keep it from souring. The form of gum arabic known as powdered acacia is the most convenient for general use, as it dissolves very quickly.

With gum arabic solution one can make his own gummed paper, for strapping plants, by taking any tough white paper and with a soft brush painting over one side with the gum arabic solution and allowing it to dry. It can then be cut into strips of various widths and used as desired.

In gumming plants a thin layer of the gum is spread out on a smooth hard surface by means of a brush. The plant to be mounted is then placed on this gummed surface and all parts are gently pressed down so that the gum is evenly distributed over the lower surface of the specimen; it is then carefully removed and transferred to the mounting paper in the position desired and the sheet placed between driers under light pressure until thoroughly dry. Later the heavier parts, such as the stems, ends of leaves, etc., are more firmly fastened by the use of narrow strips of gummed paper. This method is the best one for a collection that is to be consulted or studied a great deal.

Another general method is to lay the plant on the mounting paper in the position desired and firmly fasten it in place by the use of strips of gummed paper, without previously fastening the plant to the paper by gumming as described above. The advantage of this method is that the entire plant can, if necessary, be removed for purposes of study, which is impracticable when the specimens are gummed. Plants can be mounted without the use of gum by folding strips of paper about the stems and other coarse parts, and pinning the ends of the paper strips to the herbarium sheet.

In mounting specimens the leaves should be so arranged that both surfaces are shown. Detached flowers, fruits, small leaves, etc., are best preserved by placing them in small envelopes or packets which are attached to the sheet. Mosses, scale-mosses, most fungi, lichens, etc., can be preserved in packets which should be attached to herbarium sheets. Only one species should be mounted on a single sheet, but several specimens of the same species showing variation etc., can be attached to the same sheet.

The name of the plant, genus and species, locality, collector, and date of collection should be written on the lower right-hand corner of the sheet, or on a label attached to the sheet; sometimes other data are added but these additional data are best preserved on the field label which may be attached to either the upper or lower left-hand corner of the sheet. Herbarium labels are usually about 6 by 12 cm, and should be printed on paper of good quality.

The specimens once mounted and properly labelled are ready for distribution in the herbarium, which in arrangement is quite the same as a large card catalogue, the mounted herbarium specimens corresponding to the cards of the card catalogue. The whole herbarium can be arranged according to the relationships or assumed relationships of the families, genera, and species, or by the much simpler alphabetic method, first arranged alphabetically as to families, second under each family alphabetically as to the genera, and third under each genus of more than one species, alphabetically as to species. In practice a combination of the two methods will probably be found to be the most convenient, arranging the families according to their natural order, but under each family arranging the genera and species alphabetically.

In small collections family covers of stout tough paper which, when folded once, should be about the size of the herbarium sheets, should be supplied. The family name should be written on the lower left-hand corner and all members of the family should be distributed into the family cover or covers. In large herbaria it is usual to supply also genus covers, and even species covers, but these are not necessary in small collections. For temporary purposes specimens can very well be preserved between folded sheets of thin paper, and for this purpose old newspapers will serve very well.

For proper preservation the herbarium should be kept in tight cases or boxes, as nearly insect- and dust-proof as possible. The cases should be kept in a dry place and to repel possible insect attacks moth balls, powdered naphthalin, or some other repellant should be placed with specimens. If cases are made for the purpose they should be provided with pigeon holes about 49 cm deep, 33 cm wide, and 16 cm high.

In large herbaria it is customary to poison the specimens with corrosive sublimate. This may be done by immersing the specimens before mounting in a nearly saturated solution of corrosive sublimate in about 50 percent alcohol and again drying the specimen, or the mounted specimen can be painted over with the same solution by the use of a soft brush and then dried. Great care must be taken, however, in handling the corrosive sublimate solution on account of its poisonous properties.

GLOSSARY OF TECHNICAL TERMS

A; in Greek compounds, without, as *apetalous*, without petals.

Abnormal; contrary to the usual or the natural structure.

Abortive; imperfectly developed.

Abrupt; suddenly ending, as though broken off.

Abruptly pinnate; a pinnate leaf ending with a pair of leaflets.

Acaulescent; with a very short or no stem above ground.

Accessory; something additional.

Accresent; growing larger after flowering.

Achene; a small, dry, 1-seeded, indehiscent, seed-like fruit.

Acicular; needle-shaped.

Aculeate; armed with prickles, as the stem of the rose.

Acumen; a tapering point.

Acuminate; tapering to a point, the sides incurved.

Acute; sharply pointed, the sides straight, not incurved.

Adherent; growing fast to another body.

Adnate; united or growing together. Applied to the anther when it is fixed by its whole length to the filament or its prolongation.

Ascending; rising gradually upward.

Adventitious; out of the proper or usual place; applied to recently introduced plants that are hardly naturalized.

Aggregate fruit; a fruit composed of many more or less united carpels produced by one flower.

Ala; a wing; the lateral petals in typical leguminous (papilionaceous) flowers.

Albumen; nourishing matter stored within the seed.

Albuminous; furnished with albumen.

Alternate; one after another, as leaves placed on opposite sides of a stem, one at each node; when between bodies of the same or different sets of organs.

Ament; a slender, usually scaly, dense spike.

Amorphous; shapeless, the form not regular or uniform.
Anastomosing; forming a net-work, as the veins of leaves.
Androecium; the stamens as a whole.
Androphore; a column of united stamens.
Androus; in Greek compounds for male, or stamens, as monandrous, with one stamen.
Angiospermae; plants with ovules in a closed ovary.
Annual; a plant living a year or less, producing flowers and seeds, and then dying.
Annular; ring-like.
Annulate; marked by rings.
Annulus; a ring of thickened tissues like that of the spore-case of most ferns.
Anterior; the part of a flower next to the bract, that is, external. The side next to the axis of inflorescence is the *posterior* one.
Anther; the part of the stamen which contains the pollen.
Anthesis; the period of the expansion of a flower.
Apetalous; without petals.
Apex; the summit or tip of on organ.
Aphyllous; without leaves.
Apical; belonging to the apex or tip of any organ.
Apiculate; tipped with a small point.
Appendage; any added part.
Appendiculate; supplied with an appendage.
Appressed; pressed to the stem.
Aquatic; living or growing in water.
Arcuate; bent like a bow.
Areola; a small area marked out on a surface; a small pit.
Aril; a fleshy growth from base of and enveloping a seed.
Arillate; furnished with an aril.
Aristate; awned.
Articulated; jointed.
Ascending; directed upward.
Attenuate; narrowed gradually.
Auriculate; furnished with auricles or ear-like appendages.
Awn; a bristle or bristle-like appendage.
Awned; furnished with an awn or a bristle-shaped tip.
Axil; the angle on the upper side between a leaf and the stem.
Axile; belonging to the axis.
Axillary; occurring in an axil.
Axis; the central line of any body.

Baccate; berry-like, a fleshy, few- to many-seeded, indehiscent fruit, the seeds imbedded in pulp.
Barbate; bearded, that is bearing tufts, spots, or lines of hairs.
Basal; belonging or attached to the base.
Basifixed; attached by its base.
Beaked; ending in a prolonged narrow tip.
Bell-shaped; tubular below, inflated above, like a bell.
Berry; a fleshy, indehiscent, few- to many-seeded fruit.
Bi-, Bis.; in compound words meaning twice.
Biauriculate; having two ears.
Bicallose; having two callosities or harder spots.
Bicarinate; two-keeled.
Biennial; a plant living two years only, producing flowers and seeds the second year.
Bifid; two-cleft to about the middle.
Bifoliolate; a compound leaf of two leaflets.
Bifurcate; twice forked.
Bipinnate; twice pinnate.
Biserrate; doubly serrate, as when the teeth of a leaf are themselves serrate.
Bisexual; having both stamens and pistil.
Biternate; twice ternate.
Bladdery; thin and inflated like a bladder.
Blade; the expanded part of a leaf.
Bloom; the whitish waxy powder on some fruits and leaves.
Blunt; ending in a rounded point.
Boat-shaped; shaped like a small boat.
Bony; of hard, bone-like texture.
Bract; the small leaf or scale from the axil of which a flower or its pedicel proceeds.
Bracteate; furnished with bracts.
Bracteolate; furnished with bractlets.
Bractlet or **Bracteole**; a bract seated on the pedicel or flower-stalk.
Branch; a division of a stem or axis.
Branchlet; a small or ultimate branch.
Bristle; a stiff, sharp hair, or any slender body of similar appearance.
Bristly; supplied with bristles.
Bulb; an underground stem composed of scales.
Bulbiferous; bearing or producing bulbs.
Bulbils; small bulbs, borne above ground, usually axillary.

Caducous; falling off very early.
Caespitose; growing in turf-like patches or tufts.
Calyx; the outer envelopes of the flower.
Campanulate; shaped like a bell.
Canescent; grayish-white.
Capillary; hair-like in shape.
Capitate; having a globular apex.
Capsule; a dry, 1- to many-celled seed-vessel of a compound pistil.
Capsular; like a capsule.
Carina; a keel; the two anterior petals of a papilionaceous flower.
Carinate; keeled, furnished with a sharp ridge or projection.
Carpel; a simple pistil.
Caryopsis; the one-seeded fruit or grain of grasses.
Cartilaginous; firm and tough in texture.
Caudate; tailed, or tail-pointed.
Cauline; of or belonging to a stem.
Cell; the cavity of an anther, or of an ovary.
Cernuous; nodding.
Chaff; small membranaceous scales or bracts on the receptacles of *Compositae*, the glumes or scales of grasses, etc.

Chaffy; furnished with chaff.

Chlorophyll; the green coloring matter in plants.

Choripetalous; the petals distinct and free from each other.

Ciliate; fringed with hairs more or less resembling eyelashes.

Circinate; rolled inward from the top.

Circumscissile; opening by a circular line round the sides.

Clavate; club-shaped, slender below and thickened upward.

Claw; the narrow or stalk-like base of some petals.

Cleft; cut into lobes, about half-way to the center.

Climbing; rising by clinging to other objects.

Club-shaped; see clavate.

Clustered; collected into a compact bunch.

Coalescent; becoming united by growth.

Coccous; the separable carpels or nutlets of a dry fruit, plural *cocci*.

Coherent; the union of separate parts.

Column; the united stamens, or the stamens and pistils united into one body.

Columnar; shaped like a column or pillar.

Coma; a tuft of hairs at the ends of some seeds.

Compact; closely pressed together.

Compound; similar parts aggregated into a whole.

Complete; having all parts.

Compressed; flattened on opposite sides.

Concave; hollowed on one side.

Congested; crowded together.

Conical; having the form of a cone.

Connate; united or grown together from the first formation.

Connective; the part of the anther connecting its two cells.

Connivent; converging, or brought close together.

Continuous; the reverse of interrupted or articulated.

Contorted; twisted together.

Contracted; either narrowed or shortened.

Convex; a more or less rounded surface

Convolute; rolled up lengthwise.

Copious; numerous, or in large quantity.

Cordate; heart-shaped.

Coriaceous; resembling leather in texture.

Corm; a solid bulb, like that of the taro (*gabi*).

Corolla; the second set of floral organs, composed of petals, usually the showy part of the flower.

Corona; a body shaped like a crown.

Coronate; crowned; furnished with a corona.

~~**Corymb**~~; a flat or convex, open, compound flower-cluster, the inner flowers opening first.

Corymbose; in corymbs, or corymb-like in form.

Costa; a rib; the midrib of a leaf.

Cotyledons; the proper leaves of the embryo.

Creeping; growing flat on the ground and rooting.

Crenate; an edge with rounded teeth.

Crenulate; minutely or slightly crenate.

Crest; an elevation or ridge on the summit of any organ.

Crowded; closely pressed together.

Crown; see corona.

Crustaceous; hard and brittle in texture.

Cryptogamia or **Cryptogams**; plants not producing seeds.

Cucullate; hooded, or hood-shaped.

Culm; the hollow, jointed stem of the grasses.

Cuneate; wedge-shaped.

Cup-shaped; like a goblet or cup in form.

Cuspidate; tipped with a sharp and stiff point.

Cut; applied generally to any sharp and deep division.

Corymb ~~**Cyme**;~~ a compound, flat or convex, open inflorescence, the outer flowers opening first.

Cymose; furnished with cymes, or cyme-like.

Deciduous; falling off; applied to those trees that shed all their leaves at one time.

Declinate; turned to one side, or downward.

Decompound; several times compounded or divided.

Decumbent; reclining on the ground.

Decurrent; leaves prolonged on the stem beneath their insertion.

Definite; when of a uniform number; and not above 10 to 20.

Deflexed; bent downward.

Dehiscence; the regular splitting open of capsule or anther.

Deltoid; of a triangular shape.

Dentate; toothed, the teeth sharp and pointing outward.

Denticulate; furnished with little teeth.

Depauperate; below the natural size.

Depressed; flattened or as if pressed down from above.

Di., or **Dis.**; in Greek compounds two, or double.

Diadelpous; stamens united by their filaments in two sets.

Diandrous; having two stamens.

Dichlamydeous; having both calyx and corolla.

Dichotomous; two-forked.

Diclinous; having the stamens in one flower, the pistils in another.

Didynamous; having four stamens in two pairs.

Diffuse; spreading widely and irregularly.

Digitate; where the leaflets of a compound leaf are all borne on the apex of the petiole.

Dimorphous; of two forms.

Dioecious; the male and female flowers on different plants.

Disciform or **Disk-shaped**; flat and circular, like a disk.

Disk; the expansion of a receptacle of a flower; the central part of a head of flowers, as in the *Compositae*.

Disk-flowers; the central flowers in the *Compositae*.

Dissected; cut deeply into many lobes or divisions.

Dissepiments; the partitions of a compound ovary.

Distichous; two-ranked.

Distinct; free, not combined.

Divaricate; widely spreading or divergent.

Divided; cut into divisions down to the base or midrib.

Dorsal; pertaining to the back of an organ.

Downy; covered with soft and short hairs.

Drupaceous; like or pertaining to a drupe.

Drupe; a stone-fruit, that is the outer part soft, fleshy or fibrous, the inner part hard and bony.

Ebracteate; without bracts.

Ebracteolate; without bractlets.

Echinate; armed with prickles.

Edge; the margin or outline, as of a leaf.

Ellipsoid; a solid body showing an ellipse in longitudinal section and a circle in cross section.

Eliptic; oval or oblong, with the ends regularly rounded.

Emarginate; notched at the apex.

Endemic; confined to a country.

Endocarp; the inner layer of the pericarp.

Endosperm; the albumen of a seed.

Entire; the margins continuous, not at all toothed, notched, or divided.

Ephemeral; lasting for a day or less.

Epigynous; upon the ovary.

Epiphyte; a plant growing on another plant, but not nourished by it.

Epiphytic; relating to epiphytes.

Equal; alike in number or length.

Equilateral; equal-sided.

Erect; upright, perpendicular.

Evident; clearly visible.

Exalbuminous; destitute of albumen.

Excurrent; running out as when a midrib projects beyond the apex of a leaf.

Exindusiate; without an indusium.

Exserted; protruding, as the stamens extending beyond the corolla.

Exstipulate; destitute of stipules.

External; outward.

Extra-axillary; out of the axil, applied to flowers etc.

Extrorse; turned or opening outward.

Falcate; a leaf or other flat body curved, its edges parallel.

Fascicle; a close cluster.

Fascicled; growing in a bundle or cluster.

Female; a flower or plant bearing pistils only.

Ferruginous; resembling iron-rust in color.

Fertile; fruit-bearing, or capable of it.

Fertilization; the process by which pollen causes the embryo to be formed.

Filament; the stalk of a stamen, also any slender thread-shaped body.

Filiform; thread-shaped.

Fimbriate; fringed.

Flabelliform or **Flabellate**; fan-shaped.

Flaccid; limp, flabby.

Flagellate or **Flagelliform**; long, narrow, and flexible.

Fleshy; composed of firm pulp or flesh.

Floating; swimming on the surface of water.

Foliaceous; belonging to, or of the texture or nature of a leaf.

Foliate; provided with leaves: Latin prefixes denote the number of leaves, as bifoliate, trifoliate.

Foliolate; relating to or bearing leaflets; trifoliolate, with three leaflets, etc.

Follicle; a simple pod, opening down the inner suture.

Follicular; resembling or belonging to a follicle.

Forked; branched in two or three divisions.

Free; not united with any other parts of a different sort.

Frond; the leaves of ferns.

Fruit; the matured ovary and all it contains or is connected with.

Frutescent; somewhat shrubby; becoming a shrub.

Fugacious, lasting but a short time.

Fulvous, tawny.

Funnel-shaped; expanding gradually upward into an open mouth, like a funnel.

Furfuraceous; covered with bran-like fine scurf.

Furrowed; marked by longitudinal channels or grooves.

Fusiform; spindle-shaped.

Gamopetalous; of united petals.

Gamosepalous; of united sepals.

Geniculate; bent abruptly, like a knee.

Glabrate; becoming glabrous with age, or almost glabrous.

Glabrous; smooth, in the sense of having no hairs, bristles, or other pubescence.

Glands; small organs in the leaves, etc., which secrete oily or aromatic or other products.

Glandular; furnished with glands, or gland-like.

Glaucescent; slightly glaucous, or bluish-gray.

Glaucous; covered with a bloom, that is, with a fine, white, waxy powder that rubs off.

Globose; nearly spherical.

Glomerate; closely aggregated into a dense cluster.

Glume; the floral coverings of grasses.

Gregarious; many specimens of the same species growing together.

Gynaeceum; the pistils taken together.

Gynandrous; the stamens united with the pistil.

Gynophore; a stalk raising a pistil above the stamens.

Habit; the general appearance of a plant.

Habitat; the place in which a plant grows.

Hastate; halberd-shaped.

Head; a dense, usually globose inflorescence.

Heart-shaped; the form of a heart.

Herb; a plant that is not woody, and with no persistent parts above ground.

Herbaceous; the texture of an herb as opposed to woody.

Hermaphrodite; a perfect flower, that is, a flower having both stamens and pistils.

Heterogamous; a head containing two different kinds of flowers.

Hilum; the scar of the seed, its place of attachment.
Hirsute; with stiff, beard-like hairs.
Hispid; with short stiff, bristle-like hairs.
Homogamous; a head containing flowers of one kind only.
Hooded; hood-like.
Hooked; bristles or other appendages curved at the apex.
Horny; horn-like in texture.
Hyaline; transparent or nearly so.
Hybrid; a cross between two allied species.
Hypogynous; inserted under the pistil.

Imbricate; overlapping one another.
Imperfect; flowers in which either the stamens or pistils are wanting.
Inequilateral; unequal sided.
Incised; deeply and irregularly cut.
Included; enclosed, not exserted.
Incomplete; a flower in which the calyx or corolla is wanting.
Indefinite; very numerous.
Indehiscent; not splitting open.
Indigenous, native to a country, as opposed to introduced.
Indumentum; any hairy or scaly covering.
Indusium; the shield-like body covering the fruit-dots in ferns.
Inferior; below some other organ; specifically the ovary is said to be inferior when the floral organs grow from or near its summit.
Inflated; swollen and bladder-like.
Inflexed; bent inward.
Inflorescence; the arrangement of the flowers on the plant.
Inserted; placed on or joined to.
Internode; the part of a stem between two nodes.
Interpetiolar; between the petioles.
Introrse; turned or facing inward.
Involucre; a whorl or set of bracts around a flower, or an inflorescence.
Involute; rolled inward from the edges.
Irregular; wanting in regularity, asymmetric.

Jointed; separate or separable into distinct parts.

Keel; a projecting ridge on a surface, like the keel of a boat; the two anterior petals of a papilionaceous corolla.
Keeled; furnished with a keel or sharp longitudinal ridge.
Kidney-shaped; resembling the outline of a kidney.

Labellum; the odd, usually enlarged petal in the orchids and some other flowers.
Lacerate; with margin appearing as if torn.
Laciniate; slashed; cut into deep narrow lobes.
Lamina; the expanded part or blade of a leaf.
Lanate; woolly, clothed with long and short hairs.
Lanceolate; lance-shaped.
Latex; the milky juice of plants.
Lax; loose in arrangement, the opposite of crowded.
Leaflet; one of the divisions or blades of a compound leaf.
Leathery; tough and leather-like; coriaceous.
Legume; a simple pod which dehisces in two pieces, like that of the bean.
Lepidote; covered with small scales.
Ligule; the strap-shaped corolla in many *Compositae;* the thin appendage at the apex of the leaf-sheaths of most grasses.
Limb; the border of a corolla.
Linear; narrow, many times as long as broad, the margins parallel.
Lip; the principal lobes of a bilabiate corolla or calyx of irregular flowers.
Lobe; any projection or division of a leaf or other organ.
Loculicidal; capsules opening by splitting through the back of each cell.

Macrospore; the large spore when there are two kinds.
Male; flowers having stamens but no pistil.
Margin; the edge of a flattened body.
Median; belonging to the middle.
Membranaceous; thin and soft, of the texture of membrane.
Merous; part; used with numbers to denote the number of parts, as trimerous or 3-merous, with 3 parts, etc.
Microspore; the smaller kind of spore when there are two kinds.
Midrib; the middle or main rib of a leaf.
Monocotyledonous; with only one cotyledon.
Monoecious; male and female flowers borne on the same plant.
Mucronate; tipped with an abrupt short point.
Muricate; beset with short and hard or prickly points.

Naked; wanting some usual covering.
Naturalized; introduced from a foreign country, and established.
Nerve; a name for the ribs or veins of leaves.
Netted-veined; furnished with branching veins forming network.
Nodding; bending so that the summit hangs downward.
Node; the joints of a stem, or the part bearing the leaves or branches.
Nut; a hard, usually 1-seeded, indehiscent fruit.
Nutlet; a little nut.

Obcordate; inversely cordate, the notch apical.
Oblanceolate; the reverse of lanceolate, the broader end toward the top.
Oblique; unequal-sided; slanting.
Oblong; from two to four times as long as broad.
Obovate; a flat inversely ovate body, the broad end upward.
Obovoid; a solid body obovate in outline.
Obsolete; wanting or rudimentary.
Obtuse; blunt or round at the end.

Olivaceous; dark dull green.

Operculum; a lid.

Opposite; leaves and branches when on opposite sides of the stem from each other, one part before another as a stamen in front of a petal.

Orbicular; circular in outline.

Organ; any definite part of a plant, as a leaf, a petal, etc.

Outer; exterior.

Oval; broadly elliptic.

Ovary; that part of the pistil containing the ovules.

Ovate; like a longitudinal section of an egg, with the broader end downward.

Ovoid; a solid body ovate in outline.

Ovule; the body which is destined to become a seed.

Palea; chaff; the inner scale of grass flowers; the chaff or bracts on the receptacle of many *Compositae;* the scales on the stipes of many ferns.

Paleaceous; furnished with chaff.

Palmate; when leaflets or the divisions of a leaf all spread from the apex of the petiole like the hand with the outspread fingers.

Palmately; in a palmate manner.

Panicle; an open and branched inflorescence.

Panicled, or Paniculate; arranged in panicles, or like a panicle.

Papery; with the texture of paper.

Papilionaceous; butterfly-shaped, applied to such corollas as those of the beans.

Papillate; covered with small protuberances.

Pappus; the tuft of hairs on some seeds and fruits, or in the *Compositae* any appendages on the apex of the achene.

Parallel-veined or -nerved; leaves in which the nerves all run in straight lines either from base to apex or from the midrib to the margin.

Parasitic; taking nourishment from another plant or animal.

Parietal; attached to the walls of the ovary or fruit.

Parted; deeply cleft, the clefts not extending quite to the base.

Pectinate; divided into narrow and close division, like the teeth of a comb.

Pedate; same as palmate; but the lateral divisions 2-cleft.

Pedicel; the stalk of a single flower.

Pedicellate, or Pedicelled; borne on a pedicel.

Peduncle; a flower-stalk, whether of a single flower or of a flower-cluster.

Peduncled, or Pedunculate; furnished with a peduncle.

Pellucid; wholly or partly transparent.

Peltate; a shield-shaped leaf, whatever its shape, when the petiole is attached to the lower side, somewhere within the margin.

Pendulous; somewhat hanging or drooping.

Penta-; five, in words of Greek derivation, such as "pentamerous," with its parts in fives, etc.

Perennial; lasting from year to year.

Perfect; flowers having both stamens and pistils.

Perianth; the calyx and corolla collectively.

Pericarp; the walls of the fruit.

Perigynous; the petals and stamens borne on the calyx.

Persistent; remaining beyond the period when such parts commonly fall.

Petal; a single part of a corolla.

Petaloid; petal-like, resembling or colored like petals.

Petiole; the stalk of a leaf.

Petiole or Petiolate; furnished with a petiole.

Petiolulate; said of a leaflet when raised on its own stalk.

Petiolule; the stalk of a leaflet.

Phalanges; bundles of stamens in certain flowers.

Phanerogamous; plants bearing flowers and producing seeds.

Phylloclade; a branchlet, assuming the form and function of a leaf.

Pilose; hairy, clothed with soft slender hairs.

Pinna; a primary division of a bipinnate or tripinnate leaf (plural *pinnae*).

Pinnate; a compound leaf in which the leaflets are arranged along the sides of a common petiole.

Pinnule; a secondary division of a bipinnate or tripinnate leaf.

Pistil; the female organ of the flower, consisting of the ovary, the enclosed ovules, the stigma, and usually also the style.

Pistillate; having a pistil.

Placenta; the part of the ovary to which the ovules are attached.

Plur- Pluri; a prefix meaning several or many in Latin words, such as *plurifoliate*, with many leaves.

Pod; especially the fruit of the *Leguminosae*, a dry, usually dehiscent, few- to many-seeded fruit of a single simple carpel.

Pollen; the powder contained in the anther.

Polygamous; having some perfect and some unisexual flowers.

Polymorphous; of several or varying forms.

Polypetalous; when the petals are distinct or separate.

Posterior; the side toward the main axis.

Prickly; bearing small sharp projections as in the rose.

Procumbent; trailing on the ground.

Produced; extended or projecting.

Prominent; standing out beyond some other part.

Prostrate; lying flat on the ground.

Puberulent; covered with fine and short or almost imperceptible hairs.

Pubescent; hairy or downy, especially with fine and soft hairs or pubescence.

Pulvinate; cushion-shaped.

Punctate; marked with small dots or glands.

Pyramidal; shaped like a pyramid.

Pyrene; a seed-like nutlet or stone of a small drupe.

Pyriform; pear-shaped.

Quadri-; in words of Latin origin, four, as *quadrangular,* four-angled.

Raceme; a flower-cluster, with one-flowered pedicels arranged along the sides of a common peduncle.

Racemose; in racemes or raceme-like.

Rachis; the axis of an inflorescence or other body.

Radiate; spreading from a common center.

Radical; belonging to the root; apparently coming from the root.

Ray; parts diverging from a center; the marginal flowers of a head as in many *Compositae.*

Ray-flowers; the marginal flowers in the heads of many *Compositae.*

Receptacle; the axis of a flower or the common axis or support of a head of flowers.

Recurved; curved outward or backward.

Reflexed; bent outward or backward.

Regular; all the parts of each set of organs similar in shape.

Reniform; kidney-shaped.

Repand; wavy-margined.

Reticulate; the veins forming a network.

Retuse; an obtuse apex somewhat indented.

Revolute; rolled backward.

Rhizome; a rootstock.

Rhomboidal; approaching a rhomb in shape, an equilateral, oblique-angled figure.

Rib; the principal piece, or one of the principal pieces of the framework of a leaf, or any similar elevated line along a body.

Rootstock; root-like stems on or under ground.

Rostrate; bearing a beak or a prolonged appendage.

Rosulate; in a rosette or cluster of spreading leaves.

Rotate; wheel-shaped.

Rotund; rounded or roundish in outline.

Rudimentary; imperfectly developed.

Rugose; wrinkled.

Ruminate; looking as though chewed.

Saccate; bag-shaped.

Sagittate; shaped like an arrow head.

Salver-shaped; flowers with a slender tube, the border spreading at right angles.

Samara; an indehiscent winged fruit.

Saprophyte; a plant without chlorophyll, growing in decaying organic matter.

Scabrid; somewhat rough.

Scabrous; rough or harsh to the touch.

Scaly; furnished with scales, or scale-like in texture.

Scandent; climbing.

Scape; a peduncle rising from the ground or near it, and bearing one or more flowers.

Scorpioid; curved or circinnate at the end.

Secund; turned to one side.

Seed; the fertilized and mature ovule of a flowering plant.

Segment; a subdivision or lobe of any cleft body.

Semi-; in compound words of Latin origin, half, as *semiaquatic,* half aquatic.

Sepal; a division of the calyx.

Sepaloid; sepal-like.

Septate; divided by partitions.

Septicidal; capsules opening by splitting through the partitions.

Septum; a partition.

Seriate; in rows, as *biseriate,* in two rows.

Sericeous; silky.

Serrate; the margin cut into sharp teeth pointing forward.

Serrulate; same as the last, but with fine teeth.

Sessile; without any stalk.

Seta; a bristle.

Setaceous; bristle-like.

Setose; covered with bristles.

Sheath; the base of certain leaves which enwrap the stem, as in the grasses.

Sheathing; wrapped around the stem.

Shrub; a woody plant like a small tree but less than 4 to 5 m in height, or by some confined to similar plants which have no distinct trunk.

Silky; with a coat of fine, soft, shining, close-appressed, straight hairs.

Silvery; shining, white, like silver.

Simple; of one piece, as opposed to compound.

Sinuate; a deeply wavy margin.

Sinus; the re-entering angle between two lobes or projections.

Slender; long and thin.

Smooth; not rough.

Solitary; single.

Sorus; a fruit-dot or cluster of sporangia in ferns; plural, *sori.*

Spadix; a fleshy spike of flowers.

Spathaceous; spathe-like.

Spathe; a bract which encloses an inflorescence, as in the *Araceae.*

Spatulate; shaped like a spatula, that is, oblong, much narrowed at the base.

Spicate, Spiciform; resembling a spike.

Spike; an inflorescence like a raceme but with sessile flowers.

Spikelet; the inflorescence of grasses, one or more flowers subtended by a common pair of glumes or scales.

Spine; a sharp hard thorn.

Spinescent; tipped by a thorn.

Spinose; thorny.

Spiral; corkscrew-like in arrangement.

Sporangium; the spore-case in ferns.

Spore; the microscopic reproductive cells of the ferns and other cryptogams.

Sporocarp; the capsule or body inclosing the spores.

Spur; any projecting appendage of the flower.

Squamose; furnished with scales.

Squamiform; shaped like a scale.

Stalk; the stem, petiole, peducle, etc.

Stamen; the male organs of the flower.

Staminate; furnished with stamens.

Standard; the upper petal of a papilionaceous corolla.

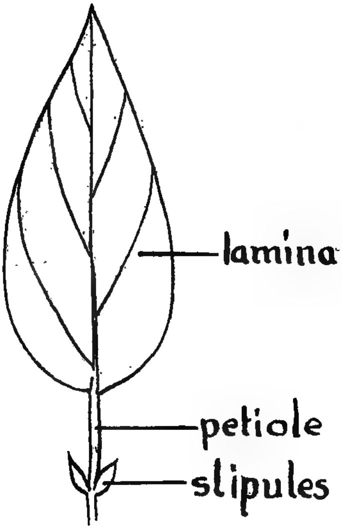
Stellate; star-like; where several similar parts spread out from a common center, like a star.
Stem; the main ascending axis of a plant.
Stemless; without, or apparently without, a stem.
Sterile; barren or imperfect.
Stigma; the part of the pistil which receives the pollen.
Stigmatic; belonging to the stigma.
Stipe; the stalk of a fern.
Stipel; a stipule of a leaflet.
Stipellate; furnished with stipels.
Stipitate; furnished with a stipe.
Stipulate; furnished with stipules.
Stipules; the appendages, on each side of the base of certain leaves.
Stoloniferous; producing stolons; that is, reclining and rooting stems.
Strap-shaped; long, flat, and narrow.
Striate; marked with slender longitudinal grooves.
Strict; straight and narrow.
Strigose; covered with appressed bristles.
Style; a stalk between ovary and stigma.
Sub-; as a prefix, about, nearly, somewhat, as *subcordate*, somewhat cordate, etc.
Subulate; awn-shaped, tapering to a sharp point.
Succulent; juicy.
Suffrutescent; slightly shrubby or woody.
Sulcate; grooved with deep furrows.
Superior; above; the ovary is said to be superior when all the floral envelopes are inserted below it.
Suture; the line of junction of contiguous parts grown together.
Symbiosis; dissimilar organisms living together.
Sympetalous; same as gamopetalous.
Syncarpous; composed of several carpels consolidated into one.

Tail; any long and slender prolongation of an organ.
Teeth; small marginal lobes.
Tendril; a slender, usually coiled, organ used for climbing.
Terete; long and round.
Terminal; borne at, or belonging to, the extremity or summit.
Ternate; in threes.
Tetragonal; four-angled.
Tetramerous; with its parts or sets in fours.
Throat; the opening of a monopetalous corolla, where the border and the tube join.
Tomentose; clothed with matted woolly hairs.
Toothed; furnished with teeth or short projections of any sort on the margin.
Top-shaped; shaped like a top, or a cone with the apex downward.
Torus; the receptacle of the flower.
Trailing; prostrate but not rooting.
Transverse; across.
Tree; a woody plant exceeding 5 to 6 m in height, with a distinct trunk.
Trichotomus; three-forked.
Tridentate; three-toothed.
Trifid; three-cleft.
Trifoliolate; of three leaflets.
Trifurcate; three-forked.
Trigonous; three-angled, or triangular.
Trilobed; three-lobed.
Trilocular; three-celled.
Trimerous; with its parts in threes.
Tripinnate; thrice pinnate.
Triquetrous; sharply three-angled.
Trumpet-shaped; tubular, enlarged at or toward the summit.
Truncate; as if cut off at the top.
Tube; any hollow, cylindric body.
Tuber; a thickened portion of a subterranean stem or branch, provided with buds on the sides.
Tubercle; a small excrescence.
Tuberous; resembling a tuber.
Tubular; hollow and elongated.
Turbinate; top-shaped.
Twining; ascending by coiling around a support.

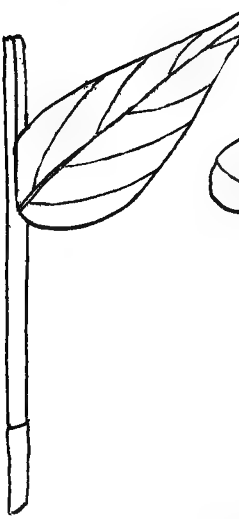
Umbel; the umbrella-like form of inflorescence.
Umbellate; in umbels.
Unarmed; destitute of spines, prickles, etc.
Uncinate; hook-shaped.
Undershrub; a very low shrub.
Undulate; wavy-margined.
Unequally pinnate; pinnate with an odd number of leaflets.
Unguiculate; furnished with a claw.
Unifoliolate; with one leaflet.
Unilateral; one-sided.
Unilocular; one-celled.
Unisexual; having stamens or pistils only.
Urceolate; urn-shaped.
Utricle; a small, thin-walled, one-seeded fruit.
Utricular; like a small bladder.

Vaginate; surrounded by a sheath.
Valve; one of the parts into which a dehiscent pod splits.
Valvate; the arrangements of petals, sepals, etc., when their margins touch but do not overlap.
Variegated; blotched or marked with various colors.
Veins; the small ribs or branches of the framework of leaves.
Veined; furnished with evident veins.
Veinless; destitute of veins.
Veinlets; the smaller branches of veins.
Venation; the veining of leaves.
Ventral; belonging to the lower or inner side of any organ, the opposite of dorsal.
Ventricose; inflated or swelled out on one side.
Verrucose; covered with small projections like little warts.
Versatile; attached by one point, so that it may swing to and fro.

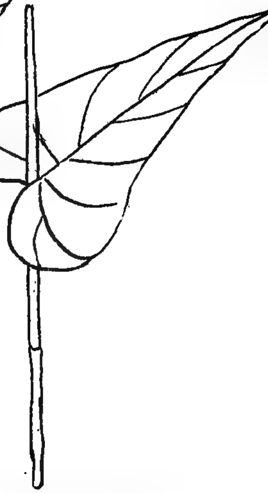
THE LEAVES


lamina
petiole
stipules

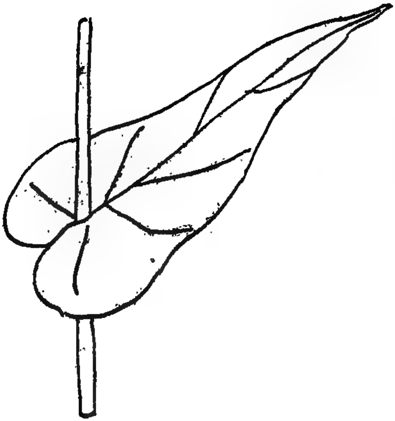
Petiolate



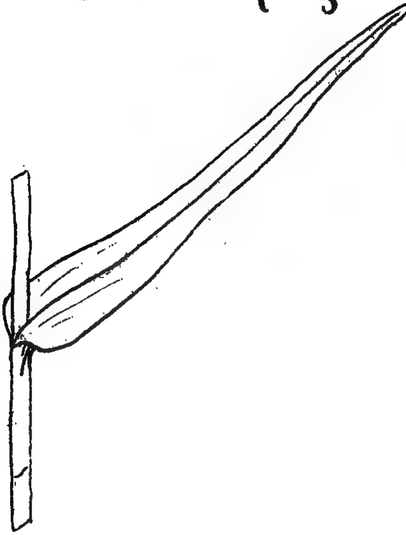
Sessile



Amplexicaul or Stem clasping

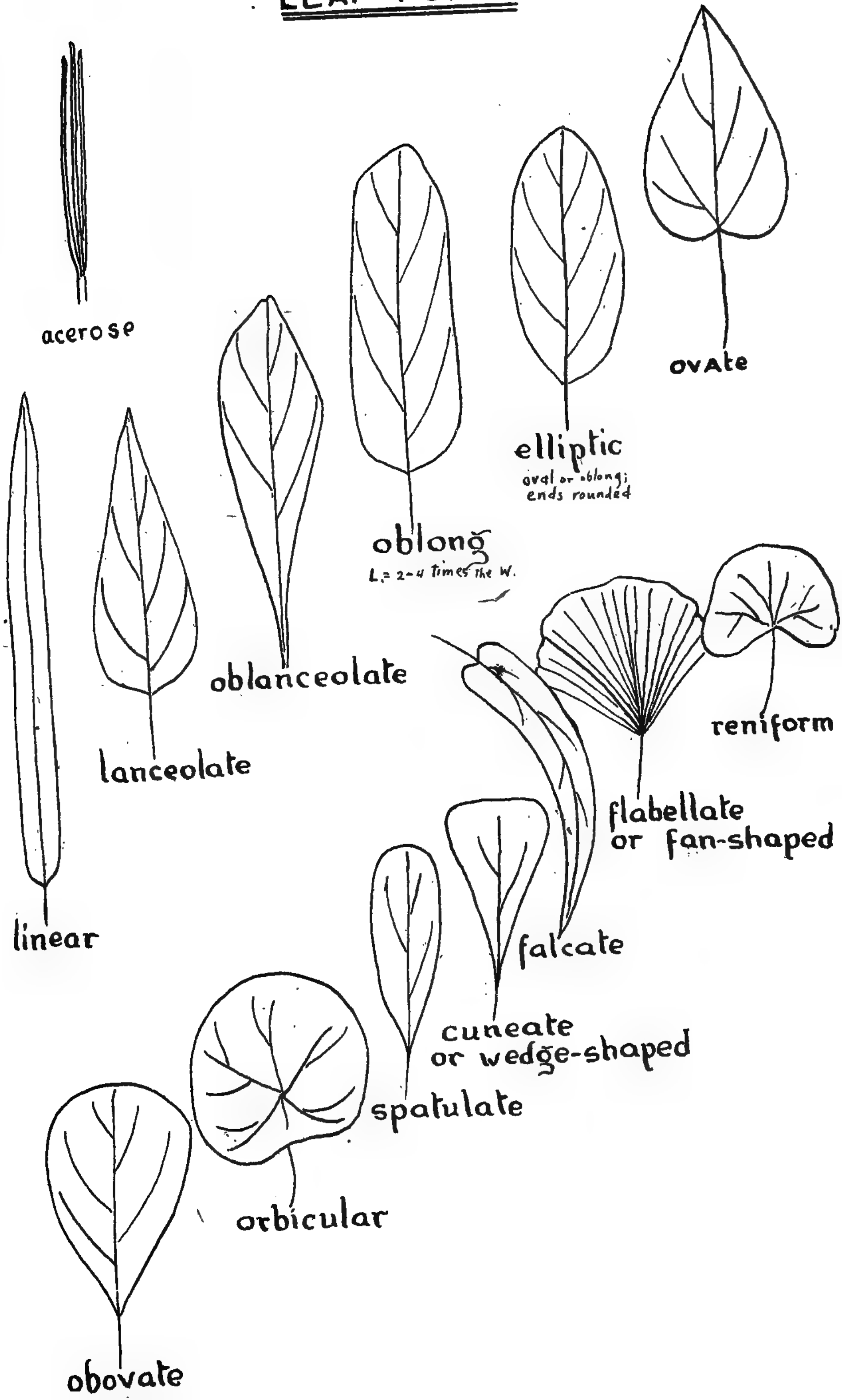


Perfoliate

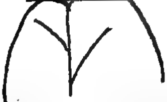


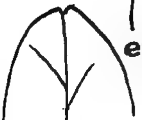
Sheathing

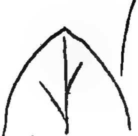
LEAF FORMS

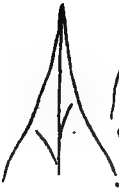

acerose
ovate
elliptic
oval or oblong; ends rounded
oblong
L.= 2-4 times the W.
oblanceolate
lanceolate
linear
reniform
flabellate or fan-shaped
falcate
cuneate or wedge-shaped
spatulate
orbicular
obovate

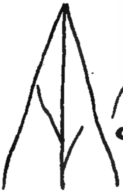
TIPS of LEAVES

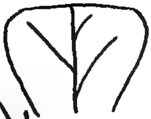

emarginate

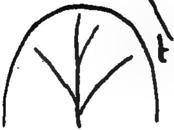

retuse

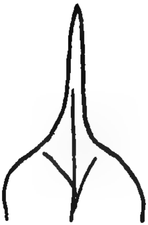

obtuse

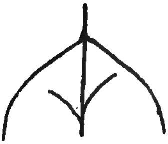

acuminate

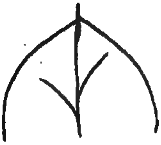

acute

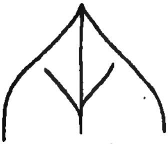

truncate

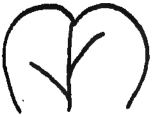

rounded


caudate

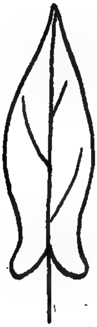

aristate

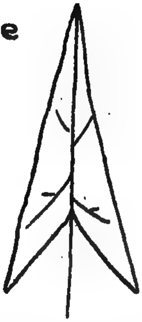

mucronate

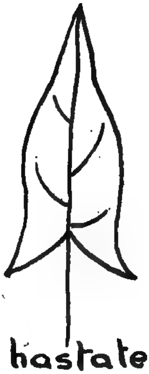

cuspidate

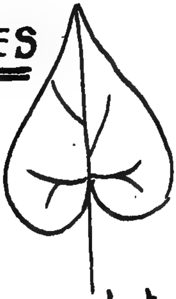

obcordate

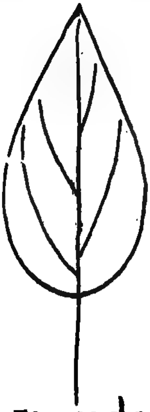
LEAF BASES

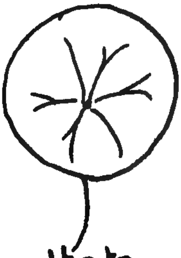

auricled


saggitate or arrow-shaped

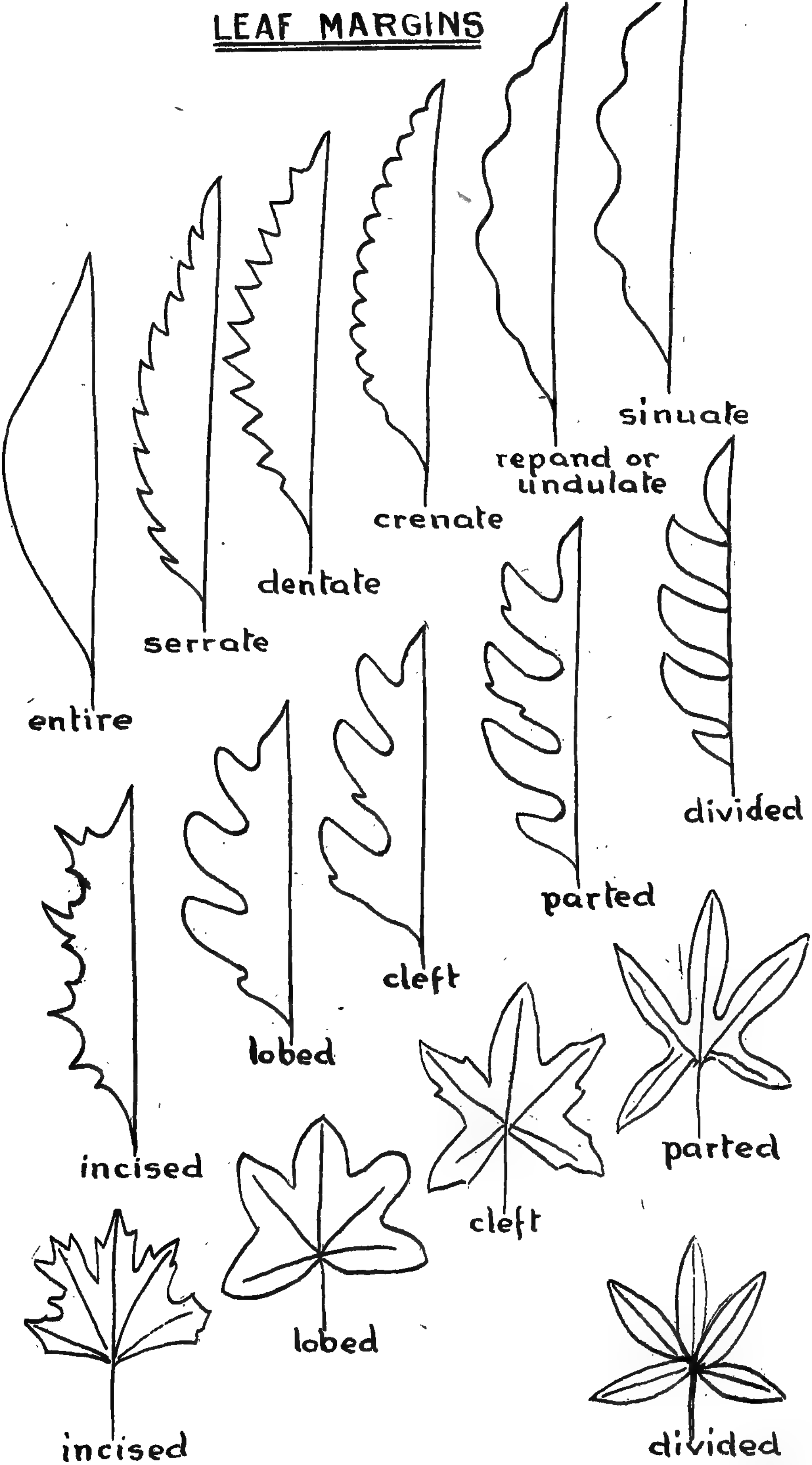

hastate


cordate

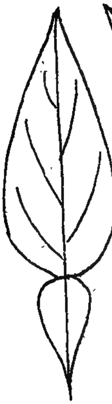

rounded


peltate

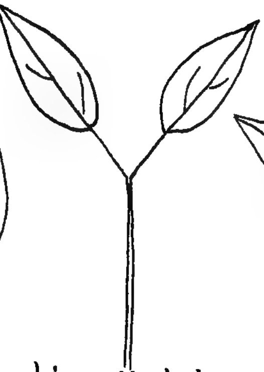
LEAF MARGINS


entire
serrate
dentate
crenate
repand or undulate
sinuate
incised
lobed
cleft
parted
divided
parted
cleft
incised
lobed
divided

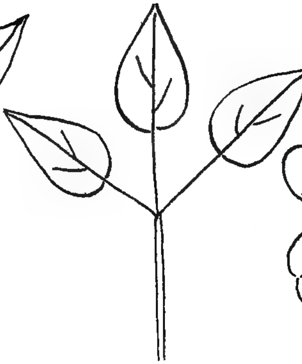
COMPOUND LEAVES



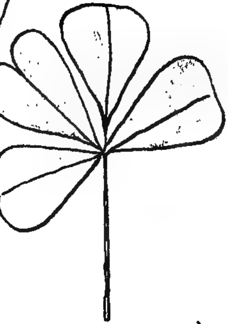
unifoliolate



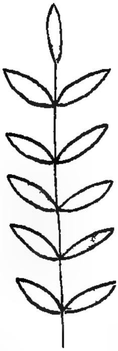
bi-foliolate



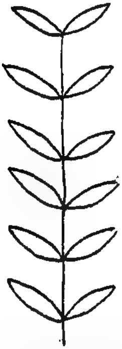
trifoliolate



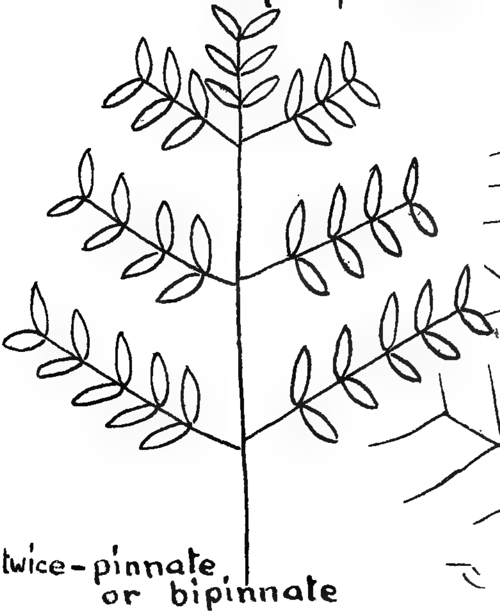
tetra or quadrifoliolate



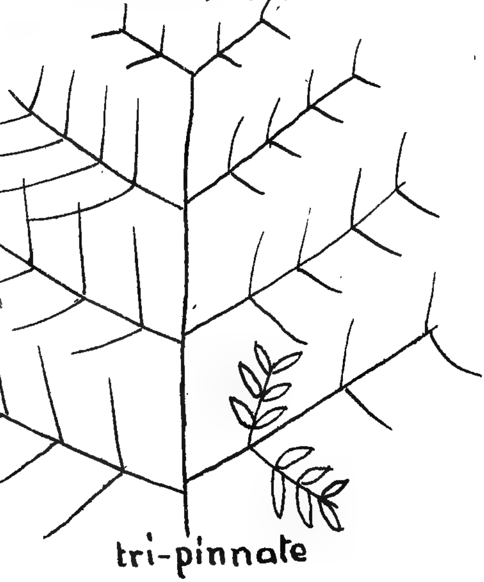
odd-pinnate or imparipinnate



even-pinnate or abruptly pinnate

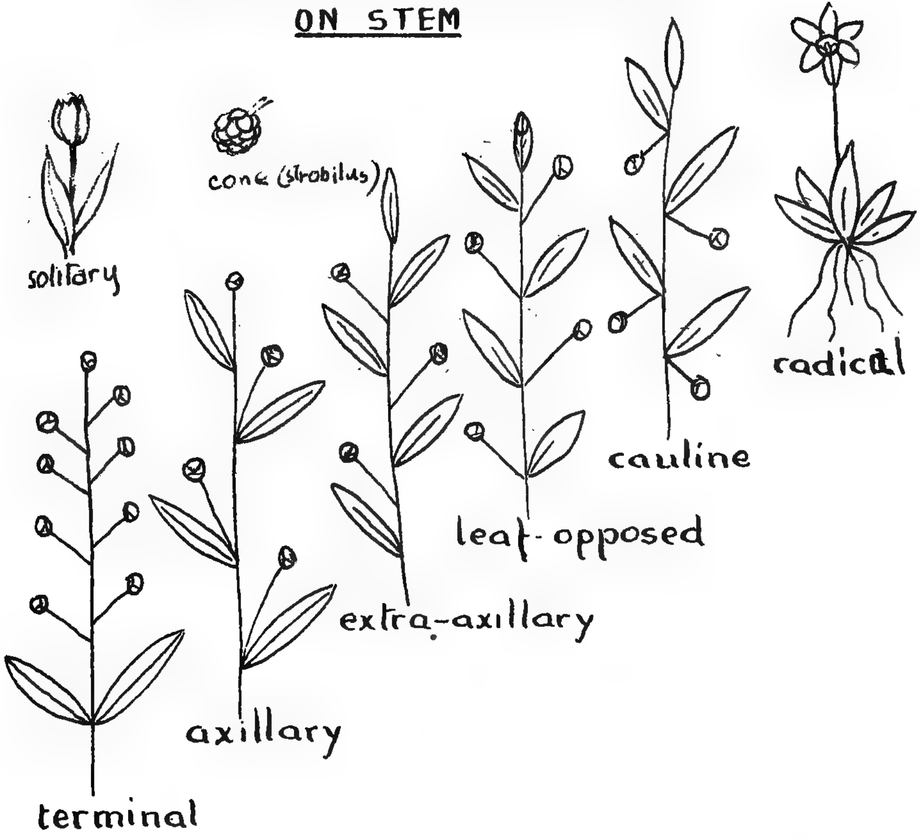


twice-pinnate or bipinnate

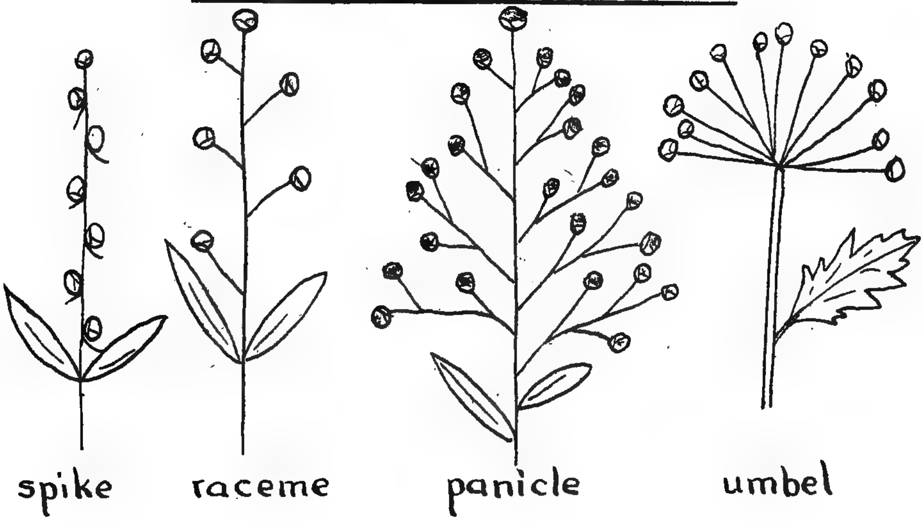


tri-pinnate

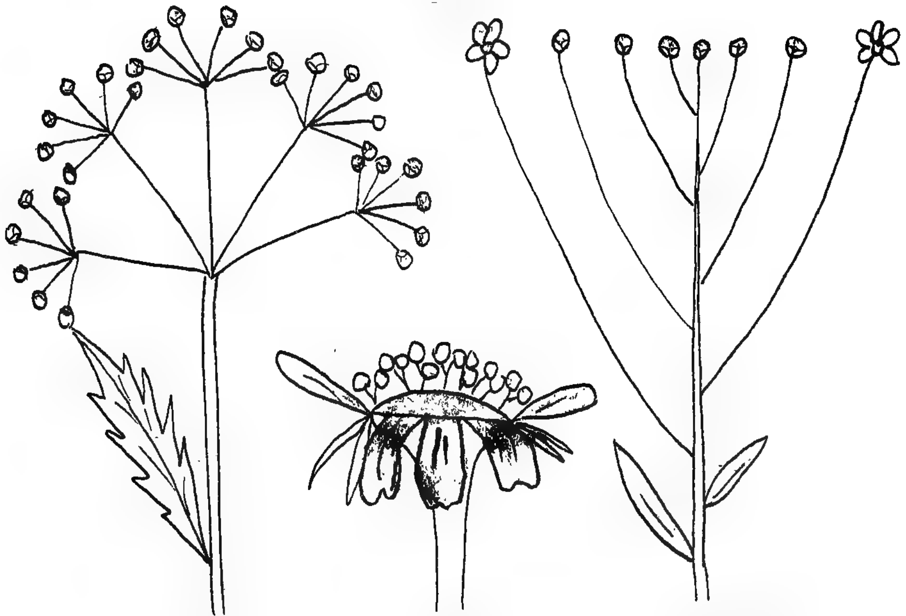
ARRANGEMENT OF FLOWERS ON STEM


solitary
cone (strobilus)
radical
cauline
leaf-opposed
extra-axillary
axillary
terminal

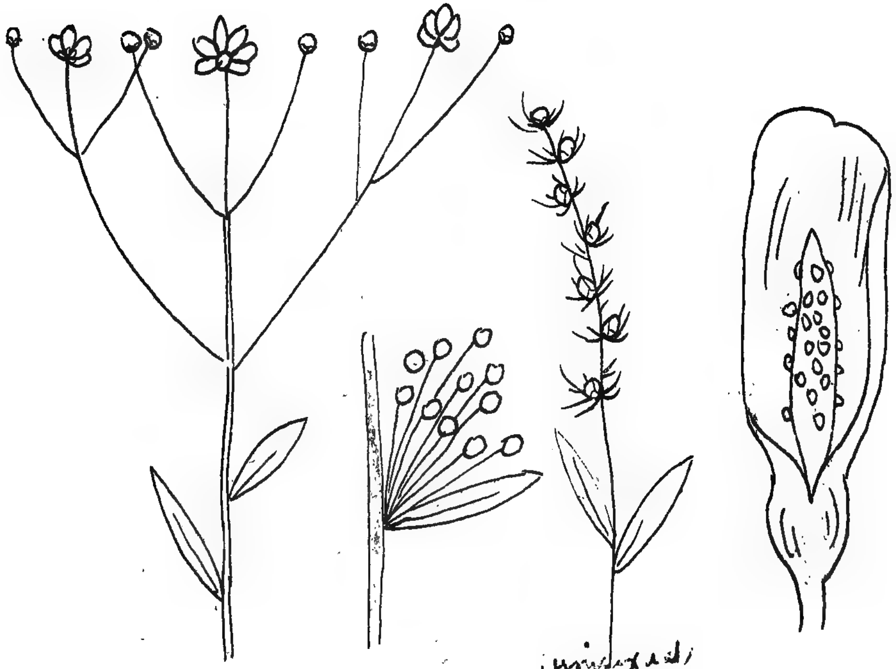
FORMS OF INFLORESCENCES


spike
raceme
panicle
umbel

FLOWERS



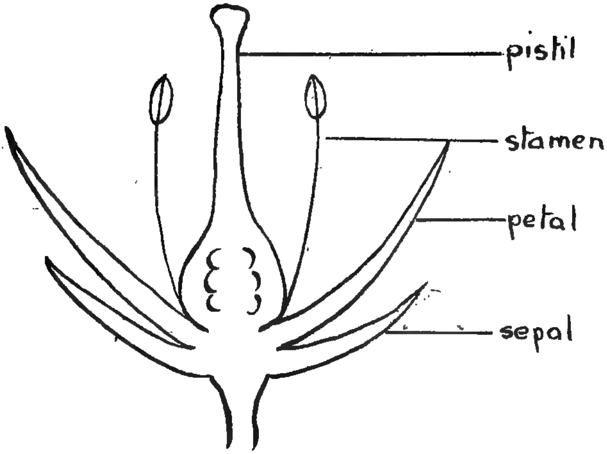
compound umbel capitate corymb or corymbose



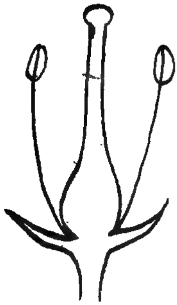
(unisexual)

cyme or cymose fascicle catkin or ament spadix

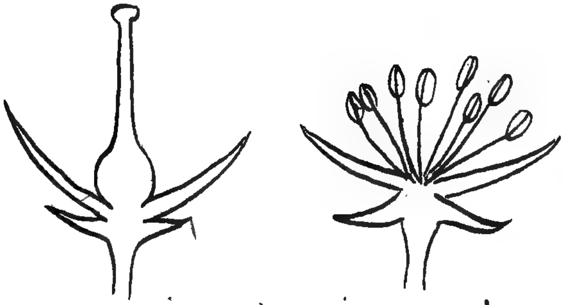
FLOWERS


pistil
stamen
petal
sepal

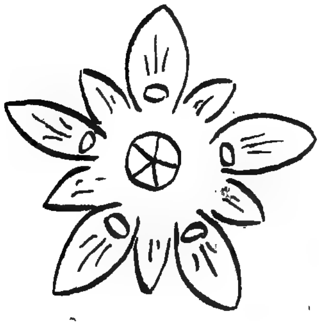
complete flower
(perfect)



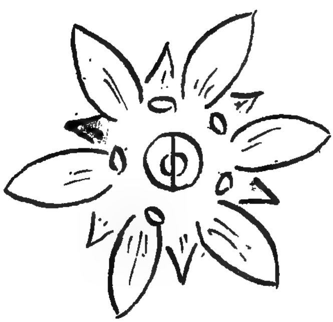
incomplete flower
(perfect)



unisexual or imperfect flowers

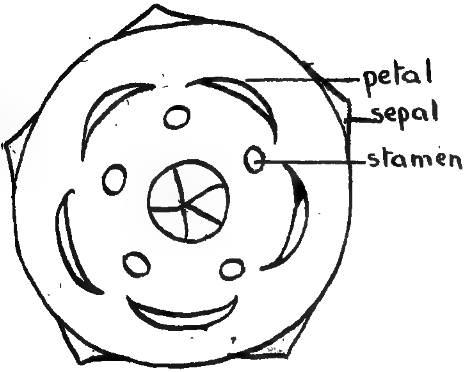


symmetrical

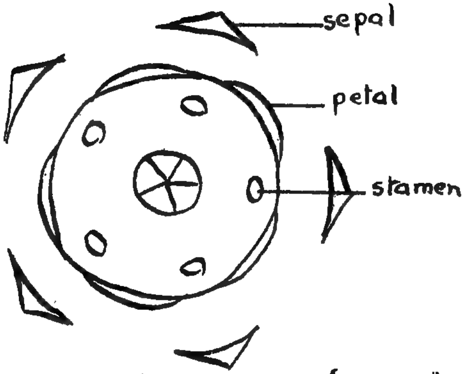


unsymmetrical

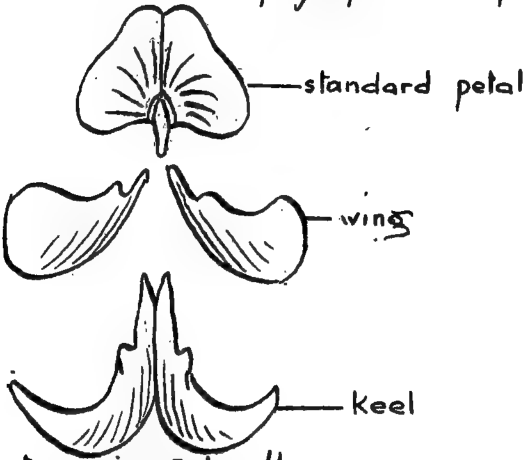
DIAGRAMS


petal
sepal
stamen

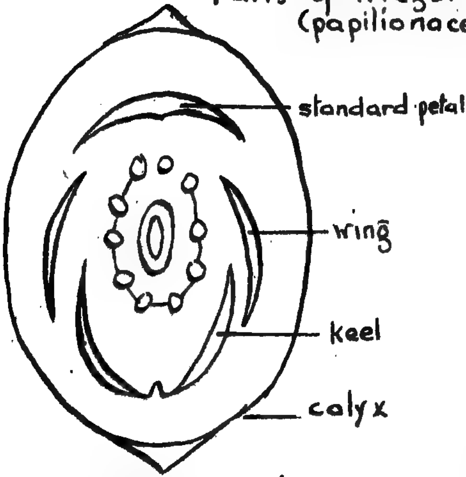
Floral diagram of regular polypetalous and gamosepalous flower


sepal
petal
stamen

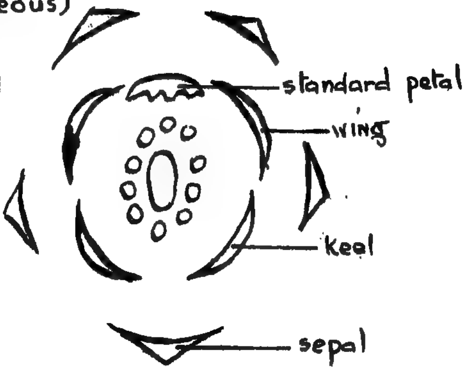
Floral diagram of a regular gamopetalous and polysepalous flower


standard petal
wing
keel

Parts of irregular flower (papilionaceous)

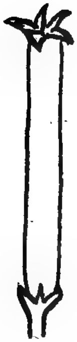

standard petal
wing
keel
calyx

Floral diagram of a papilionaceous type of

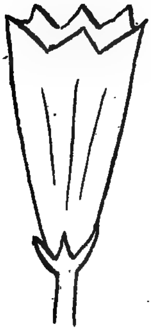

standard petal
wing
keel
sepal

Floral diagram of caesalpiniaceous type of flower

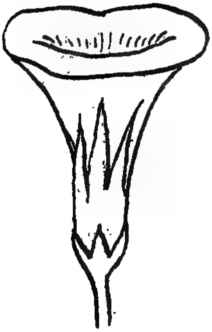
FORMS OF COROLLA



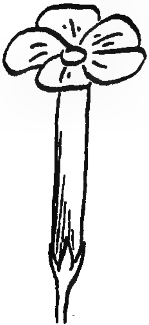
tubular



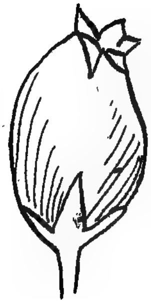
funnel-shaped



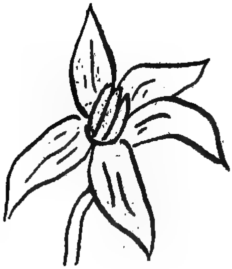
campanulate



salvershaped

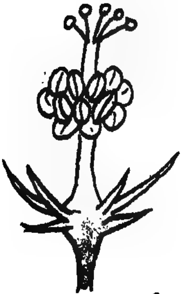


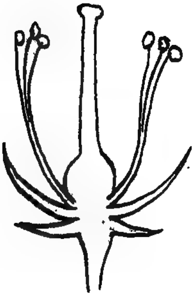
urceolate

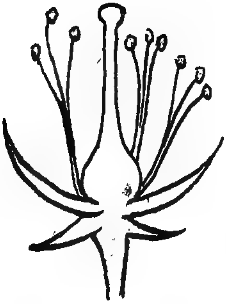


stellate or
rotate

STAMENS


monadelphous


diadelphous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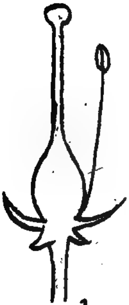
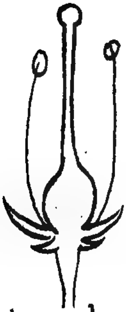
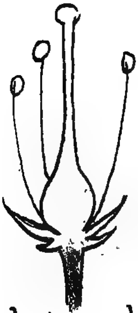
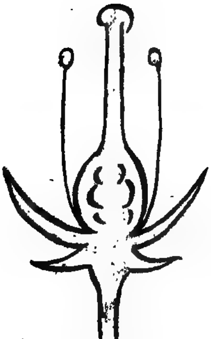
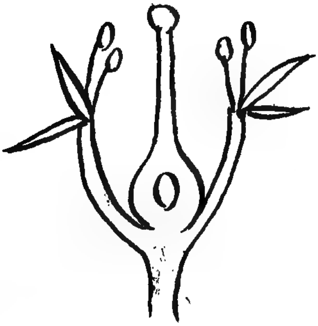
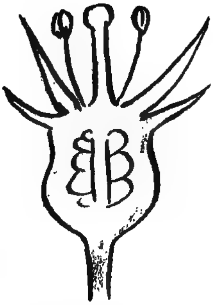

monandrous


diandrous


triandrous


hypogynous


perigynous


epigynous

Vertical; upright.
Verticil; a whorl.
Verticillate; whorled.
Villose; shaggy with long and soft hairs.
Vine; any plant with a trailing or climbing stem.
Viscid; having a sticky surface.
Voluble; twining.

Wavy; the surface or margin alternately convex and concave.
Waxy; resembling beeswax in texture or appearance.
Wedge-shaped; broad above, tapering by straight lines to a narrow base.
Whorl; an arrangement of leaves, or other organs in circles around the stem, or axis.
Whorled; arranged in whorls.
Wing; any thin expansion.
Winged; furnished with a wing.
Woolly; clothed with long and entangled soft hairs.

KEY TO THE FAMILIES[1]

1. Plants without flowers or seeds, reproduced by means of spores. I. PTERIDOPHYTA
1. Plants with flowers that produce seeds.......................... II. SPERMATOPHYTA

Div. — I. PTERIDOPHYTA

1. Leaves broad, entire or variously dissected, large in proportion to the stem.
    2. Spores minute, of one kind only; leaves entire or variously pinnately dissected, small to large.
        3. Erect, not twining.
            4. Terrestrial or epiphytic plants; sporangia arranged in sori, the annulus opening transversely................ 1. *Polypodiaceae* (p. 45)
            4. Plants growing in mud or in shallow water; sporangia scattered, the annulus opening vertically................ 2. *Parkeriaceae* (p. 59)
        3. Slender twining plants.. 3. *Schizaeaceae* (p. 60)
    2. Spores of two kinds, minute microspores, and larger macrospores borne in sporocarps; leaves 4-foliolate; plants growing in mud or in shallow water.. 4. *Marsiliaceae* (p. 61)
1. Leaves small, entire, very numerous, scale-like or awl-like, on elongated, simple or branched stems.
    2. Spores all alike, of one kind and size................ 5. *Lycopodiaceae* (p. 61)
    2. Spores of two kinds, small microspores and larger macrospores. 6. *Selaginellaceae* (p. 63)

Div. — II. SPERMATOPHYTA

1. Ovules not enclosed in an ovary, these and the seeds borne on the face of a scale or bract; stigmas none................Sub-Div. I. GYMNOSPERMAE
    2. Palm-like plants with stout trunks and stiff, fern-like, pinnate leaves, the male flowers in dense cones, the female ones few on specialized leaves.. 7. *Cycadaceae* (p. 64)
1. Ovules borne in a closed cavity (ovary); stigmas present. Sub-Div. II. ANGIOSPERMAE
    2. Cotyledon 1; vascular bundles scattered; leaves usually (not always) parallel-veined.. A. **Monocotyledoneae** (p. 34)
    2. Cotyledons 2; vascular bundles usually arranged in rings; leaves netted-veined.. B. **Dicotyledoneae** (p. 35)

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[1] In this artificial key to the families, account is taken only of the characters of those species included in the present work. For a key to all the known families represented in the Philippine flora see Copeland, E. B., "Key to the Families of Vascular Plants in the Philippine Islands." Bureau of Education Bull. 24.

(1) Class A. Monocotyledoneae

1. Flowers in the axils of scale-like, chaffy, usually imbricated bracts (glumes).
    2. Flowers perfect or 1-sexual; perianth none or of bristles or scales; ovary 1-celled; grass-like herbs.
        3. Sheaths split down one side; leaves 2-ranked; stems usually hollow; fruit a grain (caryopsis)........................ 13. *Gramineae* (p. 71)
        3. Sheaths with their margins united; leaves 3-ranked; stems solid; fruit an achene........................ 14. *Cyperaceae* (p. 106)
    2. Flowers always 1-sexual, usually monoecious; in dense, globose to ovoid, solitary heads, the bracts thin; perianth segments 3 or 6; ovary 3-celled........................ 19. *Eriocaulaceae* (p. 135)
1. Flowers very minute, naked, in pouches on the surface of very small, floating, scale-like, green plants, the perianth entirely wanting. 17. *Lemnaceae* (p. 134)
1. Flowers on a usually fleshy spadix, perfect, or the females below and the males above, the whole surrounded by a protecting spathe. 16. *Araceae* (p. 128)
1. Flowers without glumes, not on a spadix; perianth present or absent; plants of various habit but never scale-like and floating.
    2. Perianth rudimentary, of bristles or scales, never corolla-like, or entirely wanting.
        3. Terrestrial shrubs or trees, or woody vines, with elongated, spirally arranged, spiny-toothed leaves........................ 9. *Pandanaceae* (p. 66)
        3. Aquatic or marsh herbs.
            4. Marsh herbs with erect stems and long, narrow, erect leaves, the flowers in dense terminal spikes........................ 8. *Typhaceae* (p. 65)
            4. Aquatic herbs, entirely submerged or some leaves floating on the surface of the water.
                5. Leaves entire; ovary of several distinct carpels; stigmas disk-like or cup-like........................ 10. *Potamogetonaceae* (p. 67)
                5. Leaves slender, toothed; ovary of united carpels; stigmas slender........................ 11. *Najadaceae* (p. 68)
    2. Perianth of two distinct series, the inner series petal-like.
        3. Aquatic plants, mostly submerged........................ 12. *Hydrocharitaceae* (p. 68)
        3. Terrestrial plants.
            4. Woody plants, mostly tree-like, sometimes climbing, with large, pinnate, bipinnate, or fan-like leaves........................ 15. *Palmae* (p. 121)
            4. Herbaceous plants, or if woody, then with simple, narrow leaves.
                5. Flowers regular or nearly so.
                    6. Endosperm mealy.
                        7. Ovary superior.
                            8. Ovary 1-celled; rush-like slender herbs, the flowers in small, dense, long-peduncled, bracteate spikes. 18. *Xyridaceae* (p. 135)
                            8. Ovary 2- or 3-celled.
                                9. Flowers 1-sexual, monoecious, very small, in dense, long-peduncled, bracteate, globose to ovoid heads. 19. *Eriocaulaceae* (p. 135)
                                9. Flowers perfect.
                                    10. Calyx and corolla very different; stamens free. 19. *Commelinaceae* (p. 137)

10. Calyx and corolla similar, more or less united; stamens somewhat adnate to the perianth. 22. *Pontederiaceae* (p. 141)

7. Ovary inferior; plants with large fleshy fruits, and elongated, spiny-toothed leaves........ 20. *Bromeliaceae* (p. 136)

6. Endosperm fleshy, cartilaginous, or bony.

7. Ovary and fruit superior.................. 23. *Liliaceae* (p. 141)

7. Ovary and fruit inferior or partly so.

8. Stamens 6.

9. Ovary 3-celled; leaves simple, entire.

10. Erect herbs with parallel veined leaves and perfect flowers...................... 24. *Amaryllidaceae* (p. 145)

10. Twining or climbing vines, often spiny, with unisexual flowers and netted veined leaves. 26. *Dioscoreaceae* (p. 151)

9. Ovary 1-celled; leaves netted-veined, compound or palmately lobed.................. 25. *Taccaceae* (p. 150)

8. Stamens 3; leaves narrow, often equitant. 27. *Iridaceae* (p. 152)

5. Flowers very irregular; terrestrial plants.

6. Fruit fleshy, indehiscent, or capsular and with small to medium sized seeds.

7. Fertile stamens 5.............................. 28. *Musaceae* (p. 153

7. Fertile stamen 1.

8. Anther 2-celled; calyx tubular or spathe-like. 29. *Zingiberaceae* (p. 155)

8. Anther 1-celled, borne on the margin of a petal-like filament; calyx of free sepals.

9. Ovules many; flowers showy, bright-colored, large. 30. *Cannaceae* (p. 160)

9. Ovules solitary; flowers mostly small, white. 31. *Marantaceae* (p. 163)

6. Fruit capsular; seeds very minute, almost dust-like; epiphytic or terrestrial plants, sometimes saprophytic. 32. *Orchidaceae* (p. 164)

(2d Class – B. Dicotyledoneae

1. Corolla none, or the perianth-segments all alike, or the perianth entirely wanting.. 1. **Apetalae** (*Incompletae*)

1. Calyx and corolla both present, the corolla of distinct and separate petals.. 2. **Choripetalae** (p. 37) (*Polypetalae*)

1. Calyx and corolla both present, the petals more or less united. 3. **Gamopetalae** (p. 42) (*Sympetalae*)

1. Apetalae

(*Incompletae*)

(Corolla none, or the perianth segments all alike, or the perianth entirely wanting.)

1. Trees with slender, green, jointed branchlets, the leaves reduced to small scales at the nodes.......... 33. *Casuarinaceae* (p. 168)

1. Not trees with jointed branchlets.

2. Ovary superior; flowers regular.

3. Plants with milky juice.......... 75. *Euphorbiaceae* (p. 279)

4. Ovary 1-celled.......... 26. *Moraceae* (p. 172)

4. Ovary 3-celled, or cells more numerous. 75. *Euphorbiaceae* (p. 279)

3. Plants with watery juice.

4. Perianth entirely wanting; small succulent herbs or somewhat woody vines, more or less aromatic; flowers small, in slender or thickened spikes.......... 34. *Piperaceae* (p. 169)

4. Perianth present, consisting of the calyx only, or if the corolla be present, then similar to the calyx in form, color, and size.

5. Ovary 1-celled, 1-ovuled, the ovules rarely more than one.

6. Submerged aquatic plants with finely divided leaves. 50. *Ceratophyllaceae* (p. 202)

6. Not submerged aquatic plants with finely divided leaves.

7. Flowers unisexual.

8. Fruit a small drupe; stigma 2.......... 36. *Ulmaceae* (p. 171)

8. Fruit an achene, sometimes surrounded by the fleshy, accrescent perianth.

9. Ovules erect; stamens mostly inflexed in bud. 37. *Urticaceae* (p. 179)

9. Ovules pendulous; stamens mostly erect in bud. 36. *Moraceae* (p. 172)

7. Flowers perfect, or if unisexual then shrubs with flattened, jointed stems, or the anthers opening by hinged valves, not by slits or pores.

8. Anthers opening by hinged valves.

9. Leaves simple; fruit not winged; ovary enclosed in the calyx-tube but free from it; trees, or one genus slender, leafless, parasitic vines. 55. *Lauraceae* (p. 209)

9. Leaves 3-foliolate; fruit winged; vines. 56. *Hernandiaceae* (p. 212) (*Illigera*)

8. Anthers opening by longitudinal slits or by pores, never by hinged valves.

9. Herbs with sheathing stipules, vines bearing tendrils, or shrubs with flattened, jointed, leafless or nearly leafles branches.......... 42. *Polygonaceae* (p. 187)

9. Plants without sheathing stipules and without tendrils, the branches not flattened and jointed.

10. Fruit a small drupe; calyx-lobes valvate; a shrub or small tree.......... 39. *Opiliaceae* (p. 184)

10. Fruit not drupaceous; calyx-lobes imbricate or valvate.

11. Fruit entirely surrounded by the usually elongated calyx-tube.
45. *Nyctaginaceae* (p. 195)

11. Fruit not surrounded by the calyx-tube, the sepals united only at the base.

12. Flowers without bracts, the perianth not scarious................ 43. *Chenopodiaceae* (p 188)

12. Flowers with scarious bracts and perianth.
44. *Amaranthaceae* (p. 189)

5. Ovary of 4 to 8 nearly or quite free, few- to many-ovuled carpels; stamens united into a column........ 86. *Sterculiaceae* (p. 326)

5. Ovary of several united carpels.

6. Flowers unisexual............................ 75. *Euphorbiaceae* (p. 279)

6. Flowers perfect.

7. Shrubs or small trees.................. 92. *Flacourtiaceae* (p. 334)

7. Herbs.

8. Flowers 5-merous; leaves opposite or whorled; stems terete.. 46. *Aizoaceae* (p. 197)

8. Flowers 4-merous; leaves alternate; stems 4-angled.
97. *Lythraceae* (p. 340)
(*Ammannia* sp.)

2. Ovary inferior.

3. Anthers opening by hinged valves; vines with 3-foliolate leaves and winged fruits.. 56. *Hernandiaceae* (p. 212)
(*Illigera*)

3. Anthers not opening by hinged valves; leaves simple.

4. Vines with medium to large, very irregular flowers.
41. *Aristolochiaceae* (p. 186)

4. Trees with small regular flowers.......... 102. *Combretaceae* (p. 348)
(*Terminalia*)

~~Subclass~~ — Choripetalae
(*Polypetalae*)

(Calyx and corolla both present, the corolla of distinct and separate petals.)

1. Ovary superior, free from the calyx.

2. Ovary simple, of a single carpel.

3. Submerged aquatic plants with finely divided leaves.
50. *Ceratophyllaceae* (p. 202)

3. Not submerged aquatic plants.

4. Anthers opening by hinged valves................ 55. *Lauraceae* (p. 209)

4. Anthers not opening by hinged valves.

5. Twining, herbaceous, somewhat fleshy vines, with small, perfect flowers; sepals 2; fruit a dry or fleshy indehiscent utricle.
48. *Basellaceae* (p. 200)

5. Vines with small, unisexual flowers; fruit a small drupe.
52. *Menispermaceae* (p. 203)

5. Plants of various habits, with perfect flowers, or if with unisexual flowers, then shrubs or trees; sepals always more than two.

6. Herbs, vines, shrubs, or trees with regular or irregular flowers, the fruit a dehiscent on indehiscent pod (legume).
65. *Leguminosae* (p. 221)

6. Fruit not a pod (legume); flowers regular or nearly so.
    7. An erect suffrutescent herb or under-shrub; stamens 5, the filaments united into a tube; fruit a 2-valved capsule. 86. *Sterculiaceae* (p. 326) (*Waltheria*)
    7. Trees or woody vines.
        8. Vines; stamens many; fruit a small follicle. 87. *Dilleniaceae* (p. 331) (*Tetracera*)
        8. Trees; fruit indehiscent, hard or fleshy.
            9. Stamens many.......................... 88. *Guttiferae* (p. 332)
            9. Stamens few, as many or twice as many as the petals, sometimes fewer................ 76. *Anacardiaceae* (p. 298)

2. Ovary of few to many entirely free carpels, or if united at all then only at the base.
    3. Stamens as many as the petals and opposite them; vines with small unisexual flowers.............................. 52. *Menispermaceae* (p. 203)
    3. Stamens twice as many as the petals.
        4. Trees with simple leaves and small drupaceous fruits. 76. *Anacardiaceae* (p. 298) (*Buchanania*)
        4. Woody vines with pinnate leaves, the fruit a 1-seeded follicle. 64. *Connaraceae* (p. 220)
    3. Stamens many, always more than twice as many as the petals.
        4. Stamens attached to the calyx or to a disk lining its tube; sepals united below.. 63. *Rosaceae* (p. 219)
        4. Stamens attached to the receptacle; sepals usually entirely free.
            5. Sepals usually imbricate in bud, or if valvate then vines with opposite leaves.
                6. Sepals 3, deciduous; petals 6 or more, similar to the sepals, in distinct whorls; shrubs or trees. 53. *Magnoliaceae* (p. 204)
                6. Sepals 5 or more, quite different from the petals; herbs or vines.. 51. *Ranunculaceae* (p. 202)
            5. Sepals valvate in bud; woody vines, shrubs, or trees with simple alternate leaves.................................... 54. *Anonaceae* (p. 205)

2. Carpels few to many, united, forming a compound 1- to many-celled ovary; styles free or united.
    3. Stamens numerous, more than twice as many as the petals.
        4. Herbs with milky juice; flowers yellow, showy; leaves spiny. 57. *Papaveraceae* (p. 212)
        4. Not herbs with milky juice.
            5. Leaves alternate.
                6. Filaments united into a tube or in bundles.
                    7. Leaves digitately compound; fruit a capsule; seeds woolly; stamens united into bundles.... 85. *Bombacaceae* (p. 325)
                    7. Leaves simple.
                        8. Ultimate anthers 1-celled; staminal-column adnate to the base of the petals...................... 84. *Malvaceae* (p. 315)
                        8. Anthers 2-celled; staminal-column free from the petals or nearly so.......................... 86. *Sterculiaceae* (p. 326)
                6. Filaments free or nearly so.
                    7. Ovary 1-celled; fruit a prickly capsule; trees with showy flowers.. 90. *Bixaceae* (p. 333)

7. Ovary more than 1-celled.
8. Flowers unisexual........ 75. *Euphorbiaceae* (p. 279)
8. Flowers perfect.
9. Styles free, very numerous; leaves entire. 54. *Anonaceae* (p. 205) (*Anona*)
9. Styles free, about 10, radiate; leaves toothed. 87. *Dilleniaceae* (p. 331) (*Dillenia*)
9. Styles simple or entirely united.
10. Ovary raised on a stalk; woody, usually spiny vines or shrubs........ 59. *Capparidaceae* (p. 214) (*Capparis*)
10. Ovary not raised on a stalk.
11. Leaves not glandular-dotted, not jointed to the petiole........ 83. *Tiliaceae* (p. 312)
11. Leaves glandular-dotted, jointed to the winged petiole........ 69. *Rutaceae* (p. 268) (*Citrus*)
5. Leaves opposite; sepals connate into a tube, the lobes valvate. 97. *Lythraceae* (p. 340)

3. Stamens few, never more than twice as many as the petals.
4. Leaves simple.
5. Tendril-bearing vines.
6. Flowers small to large, perfect, mostly solitary; ovary 1-celled, many ovuled........ 93. *Passifloraceae* (p. 335)
6. Flowers small, often uinsexual, numerous; ovary several-celled, the ovules few........ 82. *Vitaceae* (p. 309)
5. Shrubs, trees, or woody vines, without tendrils.
6. Leaves opposite.
7. Erect shrubs; stamens 10........ 73. *Malpighiaceae* (p. 277)
7. Woody vines; stamens 5 or less, on the prominent disk. 78. *Hippocrateaceae* (p. 302)
7. Shrubs or low herbs; stamens 8........ 97. *Lythraceae* (p. 340)
6. Leaves alternate.
7. Stamens as many as the petals.
8. Stamens 3, alternating with cleft staminodes; woody vines........ 40. *Olacaceae* (p. 185)
8. Stamens 4 to 6.
~~9.~~ Stamens united in a tube........ 86. *Sterculiaceae* (p. 326) (*Melochia*)
9. Stamens free.
10. Stamens opposite the petals.
11. Flowers perfect........ 81. *Rhamnoceae* (p. 307)
11. Flowers unisexual. 52. *Menispermaceae* (p. 203)
10. Stamens alternate with the petals.
11. Ovary 1-celled; ovules many. 62. *Pittosporaceae* (p. 219)
11. Ovary several-celled; ovules 1 or 2 in each cell.
12. Flowers unisexual. 75. *Euphorbiaceae* (p. 279)
12. Flowers perfect........ 77. *Celastraceae* (p. 301)

7. Stamens twice as many as the petals.

8. Filaments connate below into a cup; ovary 3-celled; shrubs with small, axillary flowers.

67. *Erythroxylaceae* (p. 267)

8. Filaments free or nearly so.

9. Flowers perfect; leaves glandular dotted.

69. *Rutaceae* (p. 268)

9. Flowers unisexual; leaves not glandular dotted.

75. *Euphorbiaceae* (p. 279)

5. Erect herbs.

6. Flowers tetradynamous, that is, stamens 6, two shorter than the other four.. 58. *Cruciferae* (p. 213)

6. Flowers not tetradynamous.

7. Flowers irregular.

8. Ovary 2-celled; petals connate below with the staminal-sheath, the lower one keeled and crested; fruit a 2-valved, 2-seeded capsule; stipules none.

74. *Polygalaceae* (p. 278)

8. Ovary 5-celled; anterior sepal with a long spur at the base; stamens 5, their anthers connivent; capsule-valves dehiscing elastically from the axis; stipules none or represented by glands only; succulent herbs.

80. *Balsaminaceae* (p. 306)

8. Ovary 1-celled; sepals and petals 5, the lower petal spurred at the base; stamens 5, their anthers united; capsule 3-valved; stipules prominent.

91. *Violaceae* (p. 333)

7. Flowers regular.

8. Stamens free.

9. Sepals free; stipules small, scarious; styles free, as many as the cells of the ovary; leaves serrate.

89. *Elatinaceae*. (p. 332)

9. Sepals united into a tube; stipules none; style 1; leaves entire.. 97. *Lythraceae* (p. 340)

8. Stamens more or less united.

9. Filaments united throughout into an elongated, cylindric tube.. 72. *Meliaceae* (p. 273) (*Turraea*)

9. Filaments united at the base, free above.

86. *Sterculiaceae* (p. 326)

4. Leaves compound.

5. Leaves biternate; vines with inflated capsular fruits.

79. *Sapindaceae* (p. 303) (*Cardiospermum*)

5. Leaves 2- or 3-pinnate.

6. Flowers irregular; stamens 5, free, alternating with 5 staminodes; fruit an elongated, 3-angled, 3-valved capsule.

60. *Moringaceae* (p. 217)

6. Flowers small, regular; stamens 5, united below into a tube; fruit few-seeded, indehiscent, berry-like.

82. *Vitaceae* (p. 309) (*Leea*)

5. Leaves palmately 3- to 7-foliolate.
6. Herbs; fruit a dehiscent capsule.
7. Leaves 3-foliolate, the leaflets retuse; juice acid. 66. *Oxalidaceae* (p. 264) (*Oxalis*)
7. Leaves usually 5-foliolate; erect, branched, often rank-scented herbs........................ 59. *Capparidaceae* (p. 214)
6. Shrubs or small trees.
7. Leaves glandular-punctate, 3-foliolate; spiny shrubs or small trees with small to large, few- to many-seeded fleshy fruits.. 69. *Rutaceae* (p. 268)
7. Leaflets not glandular-punctate, 5- to 7-foliolate; unarmed shrubs with small drupaceous fruits. 79. *Sapindaceae* (p. 303) (*Allophylus*)
5. Leaves simply pinnate.
6. Prostrate herbs with solitary, pedicelled, axillary flowers, the fruit of spinous cocci................ 68. *Zygophyllaceae* (p. 267)
6. Erect herbs with sensitive leaves crowded at the ends of the stems; fruit a capsule........................ 66. *Oxalidaceae* (p. 264) (*Biophytum*)
6. Erect shrubs or trees.
7. Leaves glandular-punctate................ 69. *Rutaceae* (p. 268)
7. Leaves not glandular-punctate.
8. Anthers borne inside or at the apex of a tube formed of the wholly united filaments........ 72. *Meliaceae* (p. 273)
8. Stamens free, or the filaments united at the base only.
9. Sepals usually imbricate in bud.
10. Sepals free or nearly so.
11. Flowers regular; ovary 5-celled; ovules pendulous; fruit fleshy, acid, indehiscent. 66. *Oxalidaceae* (p. 264) (*Averrhoa*)
11. Flowers often irregular; ovary 1- to 4-celled; ovules erect; fruit dry or fleshy, dehiscent or indehiscent....................79. *Sapindaceae* (p. 303)
10. Sepals united at the base.
11. Ovules and seeds pendulous; plants with bitter bark........................ 70. *Simarubaceae* (p. 272)
11. Ovules and seeds erect. 76. *Anacardiaceae* (p. 298) (*Spondias*)
9. Sepals valvate in bud; trees with resinous sap. 71. *Burseraceae* (p. 273)

① Ovary inferior.
2. Stamens numerous, several to many times as many as the petals.
3. Aquatic herbs from submerged rootstocks, with large flowers, and rounded, usually floating leaves; styles and stigmas united into a radiate disk.. 49. *Nymphaeaceae* (p. 201)
3. Fleshy, green, leafless, usually spiny, terrestrial plants, with jointed stems.. 96. *Cactaceae* (p. 338)
3. Succulent terrestrial herbs with broad, inequilateral leaves; flowers unisexual; fruit a winged capsule............. 95. *Begoniaceae* (p. 338)

3. Erect trees or shrubs with broad leaves and perfect flowers.

4. Leaves alternate.................................... 100. *Lecythidaceae* (p. 345)

4. Leaves opposite, rarely clustered.

5. Calyx-lobes imbricate in bud; leaves usually with glandular dots; unarmed.. 103. *Myrtaceae* (p. 350)

5. Calyx-lobes valvate in bud; leaves not glandular-dotted.

6. Fruit crowned by the persistent calyx-lobes; branches usually spiny.. 99. *Punicaceae* (p. 344)

6. Fruit half-superior, not crowned by the calyx-lobes, the latter persistent; unarmed shrubs or trees. 98. *Sonneratiaceae* (p. 343)

2. Stamens as many or twice as many as the petals.

3. Succulent herbs with small circumsciss capsules. 47. *Portulacaceae* (p. 199)

3. Parasitic shrubs with fleshy, indehiscent fruits. 38. *Loranthaceae* (p. 183)

3. Herbaceous or suffrutescent tendril-bearing vines, often with large fleshy fruits.. 132. *Cucurbitaceae* (p. 455)

3. Not parasitic shrubs or tendril-bearing vines, the fruit never a circumsciss capsule.

4. Herbaceous plants, sometimes suffrutescent, not woody.

5. Ovules many; fruit capsular; plants with alternate, simple, entire or only slightly toothed leaves. 105. *Oenotheraceae* (p. 354)

5. Ovules 1 in each cell; leaves simple or compound.

6. Fruit a fleshy berry or drupe.......... 106. *Araliaceae* (p. 356)

6. Fruit dry when mature, splitting into two indehiscent parts (mericarps)..................................... 107. *Umbelliferae* (p. 359)

4. Shrubs, trees, or woody vines.

5. Ovules many, basal or axile; leaves simple, entire, without stipules.. 104. *Melastomataceae* (p. 353)

5. Ovules few, 1 to 5, pendulous.

6. Stipules present, caducous; leaves entire, opposite, simple; trees of the mangrove swamps. 101. *Rhizophoraceae* (p. 346)

6. Stipules none; leaves entire, simple, opposite or alternate; ovary 1-celled............................ 102. *Combretaceae* (p. 348)

6. Stipules none or adnate to the petioles as a sheath; ovary several-celled; shrubs or vines with simple or compound alternate leaves.................................. 106. *Araliaceae* (p. 356)

Subclass - Gamopetalae

(*Sympetalae*)

(Calyx and corolla both present, the petals more or less united.)

1. Ovary superior.

2. Stamens free from the corolla.

3. Flowers very irregular.................................. 74. *Polygalaceae* (p. 278)

3. Flowers regular.

4. Vines with small unisexual flowers.

5. Unarmed; leaves alternate.............. 52. *Menispermaceae* (p. 203)

5. Armed with slender axillary spines; leaves opposite. 113. *Salvadoraceae* (p. 366)

4. Erect or suberect, suffrutescent or shrubby plants with perfect, elongated, showy flowers, the calyx viscid-glandular. 109. *Plumbaginaceae* (p. 361)

2. Stamens partly adnate to the corolla.

3. Stamens opposite the lobes of the corolla, as many as the lobes or more numerous.

4. Ovary of several free or nearly free carpels; succulent herbs. 61. *Crassulaceae* (p. 217)

4. Ovary of a single carpel or of several united ones.

5. Ovary 1-celled.

6. Erect, normally unbranched trees with milky juice, large palmately lobed leaves, dioecious flowers, and large, fleshy, many-seeded fruits.............................. 94. *Caricaceae* (p. 337)

6. Shrubs, trees, or woody vines with watery juice; small, usually perfect flowers; undivided leaves; and small 1-seeded fruits. 109. *Myrsinaceae* (p. 360)

5. Ovary several-celled; trees.

6. Styles or stigmas distinct; flowers mostly unisexual; juice watery.. 111. *Ebenaceae* (p. 363)

6. Styles and stigmas united; flowers mostly perfect; juice milky. 110. *Sapotaceae* (p. 362)

3. Stamens fewer than the lobes of the regular corolla and alternate with them; woody shrubs or vines................ 112. *Oleaceae* (p. 364)

3. Stamens as many as the lobes of the corolla in regular flowers and alternate with the lobes, or sometimes fewer in irregular flowers.

4. Carpels distinct, at least below, sometimes united at the apex by the styles; plants with milky juice.

5. Styles united; stamens distinct; pollen of loose grains; shrubs, trees, or woody vines........................ 116. *Apocynaceae* (p. 368)

5. Styles distinct, united by the stigma only; stamens usually united; pollen united in waxy masses or the grains in groups of four; herbs or vines................ 117. *Asclepiadaceae* (p. 375)

4. Carpels entirely united.

5. Ovary 1-celled.

6. Flowers irregular.

7. Aquatic submerged herbs with inflated bladder-like leaves, or delicate, unbranched, leafless or nearly leafless herbs growing in damp places.... 128. *Lentibulariaceae* (p. 432)

7. Terrestrial herbs or shrubs with broad leaves. 127. *Gesneriaceae* (p. 431)

6. Flowers regular or nearly so; erect unbranched herbs with opposite leaves................................ 115. *Gentianaceae* (p. 367)

5. Ovary 2- or falsely 4-celled.

6. Leaves with stipules or stipular scars. 114. *Loganiaceae* (p. 366)

6. Stipules none.

7. Flowers regular.

8. Herbs with radical leaves and small scarious flowers in dense elongated spikes; capsules small, circumsciss. 130. *Plantaginaceae* (p. 444)

8. Flowers not scarious nor in dense spikes; fruit not circumsciss.

9. Fruit a berry.......................... 128. *Solanaceae* (p. 413)

9. Fruit capsular.

10. Ovules and seeds few, 1 or 2 in each cell; mostly twining vines..............118. *Convolvulaceae* (p. 381)

10. Ovules many; erect, herbaceous or woody plants, rarely vines.

11. Stamens 4.............. 124. *Scrophulariaceae* (p. 419)

11. Stamens 5.

12. Styles 2, distinct. 119. *Hydrophyllaceae* (p. 392)

12. Styles united............... 123. *Solanaceae* (p. 413)

9. Fruit drupaceous or on achene, or of 2 or 4 nutlets. 128. *Boraginaceae* (p. 393)

7. Flowers irregular; stamens 4, in 2 pairs, or sometimes 2 only.

8. Fruit drupaceous or an achene, or of two to four 1-seeded nutlets.

9. Style apical; ovary not lobed. 121. *Verbenaceae* (p. 396)

9. Style arising between the four lobes of the ovary; plants often aromatic and frequently with 4-angled stems.. 129. *Labiatae* (p. 406)

8. Fruit capsular, dehiscent or indehiscent.

9. Ovary with axile placentae.

10. Capsules opening elastically from the apex; seeds usually supported on a curved hook (retinacula); leaves mostly opposite. 129. *Acanthaceae* (p. 433)

10. Capsules not opening elastically; retinacula none.

11. Leaves always alternate; capsule fleshy. 123. *Solanaceae* (p. 413) (*Brunfelsia*)

11. Leaves mostly opposite, sometimes whorled; capsule dry.

12. Seeds without endosperm. 126. *Pedaliaceae* (p. 431)

12. Seeds with endosperm. 124. *Scrophulariaceae* (p. 419)

9. Ovary with parietal placentae.

10. Seeds minute; leaves always simple; ovary 1-celled; p 127. *Gesneriaceae* (p. 431)

10. Seeds large, often winged, in dehiscent capsules, or if indehiscent then wingless and imbedded in pulp; leaves mostly compound. 125. *Bignoniaceae* (p. 426)

Placentation; parietal in 1-celled ovary
axile in 2-celled ovary; placenta 2 in ea

1. Ovary inferior.

2. Flowers not in dense heads.

3. Stamens attached to the corolla.

6. Parasitic shrubs; stipules none........ 38. *Loranthaceae* (p. 183)

6. Tendril-bearing vines.................... 132. *Cucurbitaceae* (p. 455)

6. Herbs, shrubs, vines, or trees with opposite leaves, watery juice, the stipules always present; tendrils none. 131. *Rubiaceae* (p. 445)

6. Herbs without stipules or tendrils, usually with milky juice. 133. *Campanulaceae* (p. 462)

3. Stamens free from the corolla.
  4. Stamens and pistil distinct.
    5. Corolla regular.................................. 133. *Campanulaceae* (p. 462)
    5. Corolla irregular................................ 134. *Goodeniaceae* (p. 463)
  4. Stamens and pistil united into a column; small herbs. 135. *Stylidiaceae* (p. 463)

2. Flowers crowded in dense heads.
  3. Heads not involucrate; leaves opposite, stipulate; flowers regular; anthers free.. 131. *Rubiaceae* (p. 445)
  3. Heads surrounded by an involucre composed of many bracts; leaves various; flowers regular or irregular; anthers united; fruit an achene .... 136. *Compositae* (p. 464)

DESCRIPTIONS OF THE FAMILIES, GENERA, AND SPECIES

PTERIDOPHYTA. FERNS AND FERN-LIKE PLANTS

In this group, also commonly known as the vascular cryptogams, reproduction is by means of spores of microscopic size, not by true seeds as in the flowering plants. In the systematic treatment certain technical terms are used, the most important being the following: The vegetative parts, corresponding to the leaves of flowering plants, are commonly called *fronds*, and in compound ones the divisions are called *pinnae*, the ultimate divisions the *pinnules*; the part corresponding to the stem is called the *stipe*. The spores are borne variously, but in the true ferns usually in *sori* (dot-like organs on the lower surface, margins, etc.), each *sorus* being made up of many *spore-cases* or *sporocarps* containing the spores; the partial or entire ring of thickened tissue surrounding the sporocarp is called the *annulus*. The sori may be protected by a thin, variously shaped and attached organ known as the *indusium*, which may be persistent or deciduous; it is frequently entirely absent. In some groups the spores are of two kinds, *macrospores* and *microspores*, the former being much larger than the latter.

The most important supplementary literature for the Philippine forms are the following papers by Dr. E. B. Copeland: "The Polypodiaceae of the Philippine Islands" Govt. Lab. Publ. (Philip.) 28 (1905) 1–138, in which 62 genera and 450 species of Philippine ferns are described, and "The Ferns of the Malay-Asiatic Region, Part I" Philip. Journ. Sci. 4 (1909) Bot. 1–64, including the *Ophioglossaceae, Marattiaceae, Marsileaceae, Salviniaceae, Osmundaceae, Schizaeaceae, Gleicheniaceae, Parkeriaceae, Matoniaceae*, and *Cyatheaceae*.

1. POLYPODIACEAE (POLYPODY OR PACO FAMILY)

Ferns of very various habit from creeping or erect rootstocks, the stipes tufted or scattered, jointed to the rootstock or not, the fronds entire or variously lobed, pinnate, or decompound, the veins free or variously anastomosing. Sori definite, various in shape (round, oblong, or linear), dorsal or marginal, or sometimes indefinite and densely crowded over the entire lower surface of the frond, the sporangia usually stalked and provided with a longitudinal, incomplete annulus, interrupted by the stalk, opening transversely. Indusium present or absent.

Genera about 120, species nearly 5,000, in all parts of the world, 81 genera and about 700 species in the Philippines.

1. Sori densely covering the entire back of the frond, or parts of the frond.

  2. Fronds pinnate; very coarse terrestrial ferns of brackish swamps, the sporangia not gathered into sori.......... 16. *Acrostichum*

  2. Fronds simple, entire; epiphytic ferns from creeping rootstock the sporangia in contiguous sori.......... 14. *Cyclophorus*

  2. Fronds finely 3- or 4-pinnately divided, the ultimate segments small, the fertile ones golden-yellow on the lower surface, the indusium consisting of the reflexed margins of the segments...... 10. *Onychium*

1. Sori definite, on the back of the frond, scattered, or in regular rows, not strictly marginal.

  2. Fronds entire, dimorphous, the sori reticulate, following the nerves over the entire lower surface.......... 6. *Hemionitis*

  2. Fronds pinnately lobed, pinnate, or decompound.

    3. Sori round or nearly so.

      4. Indusium present.

        5. Pinnae articulated to the rachis.......... 2. *Nephrolepis*

        5. Pinnae not articulated to the rachis.......... 1. *Dryopteris*

      4. Indusium none.

        5. Fronds all alike.......... 13. *Polypodium*

        5. Fronds dimorphous; basal, sterile, concave, humus-gathering ones which are at first green, soon becoming brown, and ordinary green, pinnately lobed fertile fronds.......... 15. *Drynaria*

    3. Sori elongated.

      4. Indusium wanting; finely pinnately compound ferns, the lower surface covered with white waxy powder.......... 7. *Ceropteris*

      4. Indusium present.

        5. Veins forming regular areolae, or if not then the sori often double, on both sides of the veinlets.......... 4. *Athyrium*

        5. Veins not forming regular areolae, except sometimes at the margin, the sori always simple.......... 5. *Asplenium*

. Sori marginal, definite.

  2. Indusium half cup-shaped, attached by the base and margins, opening outward.......... 3. *Davallia*

  2. Indusium formed of the reflexed modified or unmodified margin of the frond.

    3. Sori borne on the inner face of the reflexed leaf-margin.

    [illegible] 11. *Adiantum*

    3. Sori not on the inner surface of the reflexed-margin, protected by it, but borne on the frond itself.

      4. Sori linear, on a strand connecting the tips of the veins, the reflexed margin of the leaf continuous; usually coarse, not finely divided ferns.......... 12. *Pteris*

      4. Sori terminal on the veins, at first distinct, later confluent, the reflexed margin of the leaf interrupted; slender, finely divided ferns.......... 9. *Cheilanthes*

  2. Indusium none; otherwise very similar to *Cheilanthes*.... 8. *Notholaena*

1. DRYOPTERIS Adanson (*Nephrodium* Rich.)

Rootstocks creeping or erect, the stipes scattered or clustered, not jointed to the rootstock. Fronds elongated, simply pinnate or 2- to 4-pinnate, the veins free, or the lower ones anastomosing and forming on each side of the midribs of the pinnules a single row of regular deltoid areolae with an excurrent veinlet springing from the apex, free or jointed in the angle of the next upper anastomosing veins, often forming one or more rows of rhomboid areolae between the costal ones and the margin. Pinnules mostly equilateral, entire, toothed, or lobed, glabrous, puberulent, or ciliate. Sori numerous, medial or submarginal, in regular rows on the veins. Indusium usually reniform, attached by the sinus, deciduous or persistent. (Greek "oak" and "fern.")

Species about 800 in all parts of the world, about 100 in the Philippines.

1. Fronds simply pinnate.
  2. Basal pinnae reduced to small, auricular appendages less than 1 cm long .... 1. *D. basilaris*
  2. Basal pinnae not reduced, or only slightly so.
    3. Veins anastomosing, the ultimate lobes not extending more than one-half to the midrib .... 2. *D. parasitica*
    3. Veins free, the ultimate lobes extending nearly to the midrib. 3. *D. luerssenii*
1. Fronds more divided, bipinnate or tripinnatifid, at least the lower pinnae.
  2. Only the lower pinnae again pinnate, the upper part of the frond simply pinnate; frond glabrous .... 4. *D. dissecta*
  2. All the pinnae again pinnate; frond prominently white-ciliate on the lower surface .... 5. *D. setigera*

1. **D. basilaris** (Presl) C. Chr.

Rootstocks stout, suberect, the stipes tufted, 15 to 40 cm long, somewhat sulcate and angled, usually puberulent, the base clothed with long, filiform, brown, spreading scales. Fronds 30 to 65 cm long, 15 to 20 cm wide, oblong, acuminate, simply pinnate, more or less puberulent, the base abrupt, but with 8 to 16, distant, much-reduced, auricular, orbicular to ovate pinnae less than 1 cm long along the stipe, the normal pinnae lanceolate to linear-lanceolate, rather close, spreading-ascending, slenderly acuminate, alternate, sessile or subsessile, 25 to 40 on each side, 7 to 10 mm wide, 10 to 14 cm long, the base slightly inequilateral, subacute or somewhat truncate, the margins coarsely toothed. Sori small, numerous, 3 to 5 in a row on each side of the primary veins, the indusium persistent.

Along small streams on ledges, San Juan del Monte; widely distributed in the Philippines. Endemic.

2. **D. parasitica** (L.) O. Ktze.

Rootstock short, stout, erect, clothed with linear brown scales on the young parts, the stipes glabrous or puberulent, with few scattered scales near the base, 10 to 50 cm tall. Fronds oblong, 20 to 50 cm long, simply pinnate; pinnae 8 to 15 pairs, slenderly acuminate, base truncate, the basal ones not reduced, oblong to lanceolate, 4 to 10 cm long, pinnately lobed one-third to one-half to the midrib into numerous, ovate to oblong, obtuse, falcate lobes, glabrous or somewhat puberulent, the veinlets anastomosing near the midrib. Sori indusiate, in two rows one on each lobe about half-way between the mid-nerve and margin.

In dry thickets, Masambong to Guadalupe; widely distributed in the Philippines. All tropical countries.

3. **D. luerssenii** (Harr.) C. Chr.

Rootstock stout, creeping or suberect, covered with brown scales, the stipes tufted, erect, glabrous, somewhat angled, pale, slender, 8 to 40 cm long. Fronds lanceolate to oblong-lanceolate, simply pinnate, 20 to 50 cm long, 6 to 20 cm wide, acuminate, the basal pinnae slightly shortened; pinnae distant, 10 to 20 on each side, lanceolate, acuminate, 8 to 20 mm wide, cut nearly to the rachis into numerous, linear-spatulate to linear-oblong, acute lobes, the sinuses as broad or nearly as broad as the lobes, the lower surface slightly pubescent or nearly glabrous. Sori 3 to 5 on each side of the midrib of each lobe, small, the indusium subpersistent, glabrous.

San Juan del Monte, occasional; widely distributed in the Philippines. Endemic.

4. **D. dissecta** (Forst.) O. Ktze.

Stipes tufted, with linear, dark-brown scales near the base, otherwise glabrous, 10 to 30 cm long. Fronds 25 to 60 cm long, oblong, simply pinnate, or the lower pinnae again pinnate, up to 15 cm long, acuminate, pinnatifid, the lobes oblong, obtuse, entire or crenate, or the basal ones pinnately lobed, thin, glabrous, the veinlets free. Sori numerous, about 1 mm in diameter, submarginal.

In thickets, about old wells, ravines, etc., Pasay and Masambong; widely distributed in the Philippines. Madagascar through tropical Asia and Malaya to Polynesia.

5. **D. setigera** (Blume) O. Ktze.

Rootstock stout, erect or suberect, the stipes tufted, 25 to 70 cm long, the base with numerous, pale, linear-lanceolate, spreading scales, the upper part usually glabrous or nearly so. Fronds ample, ovate to deltoid-lanceolate, 30 to 100 cm long, tripinnatifid, the lower pinnae longest, 15 to 30 cm long, 5 to 11 cm wide, oblong to lanceolate, the rachis very narrowly winged; pinnules close, lanceolate to linear-lanceolate, acuminate, 5 to 15 mm wide, cut nearly to the rachis into numerous, close, oblong, toothed lobes, the lower surface, and sometimes also the upper one with few to many, weak, spreading, white hairs. Sori minute, numerous, 2 to 4 on each side of the midvein on each lobe of the pinnules, the indusium falling very early.

In thickets, Diliman, also occasionally cultivated in Singalong, etc.; widely distributed in the Philippines. India to Japan, southward to Australia and Polynesia.

2. NEPHROLEPIS Schott

Simply pinnate, terrestrial or epiphytic, often much elongated ferns, from erect, creeping, or climbing rootstocks, often stoloniferous, the stipes not jointed to the root-stocks, the pinnae jointed to the rachis. Sori round or reniform, prominent, submarginal or medial in one row on each side of the midrib, terminal on the anterior veinlets or at the once forked veins, or marginal and uniting the apices of two or more veins. Indusium reniform, attached by the sinus, the lobes often meeting or overlapping, the indusium then becoming round and peltate, opening all around the edge or nearly so, or 2-valved and marginal, attached at the inner side, opening outward. (Greek "kidney" and "scale," allusion to the shape of the indusium.)

Species about 17, in all tropical countries, about 7 in the Philippines.

1. Fronds very narrow, 1 to 2 cm wide, the pinnae of two oblong to orbicular, imbricated leaflets; cultivated only.. 1. *N. duffii*
1. Fronds 2.5 to 5 cm wide; pinnae oblong, prominently auricled at the base. 2. *N. cordifolia*
1. Fronds 8 cm wide or more; pinnae oblong to linear-lanceolate, elongated.
  2. Pinnae deeply pinnately lobed, the lobes narrow, close, variable in length; fronds prominently brown-ciliate; cultivated only. 3. *N. floccigera*, var. *monstruosa*
  2. Pinnae entire, or only slightly crenate or toothed.
    3. Fronds nearly glabrous, elongated, often exceeding 2 m in length, the pinnae usually not auricled; sori distant from the margins. 4. *N. biserrata*
    3. Fronds more or less brown-ciliate; pinnae always auricled on the upper side at the base; sori marginal or submarginal. 5. *N. hirsutula*

*1. N. DUFFII Moore.[1]

Tufted, from stout rootstocks, the rachis and stipes chaffy with brownish scales and hairs, the rachis 8 to 15 cm long. Fronds narrow, linear, elongated, 20 to 35 cm long, 1 to 2 cm wide, narrowed toward the base, the apex often forked. Pinnae numerous, the lower ones reduced and distant, the central ones close, each consisting of 2, oblong to orbicular, imbricated leaflets which are joined at the base, their margins entire or crenate, usually less than 1 cm long.

Cultivated, not spontaneous; introduced. A native of Malaya and northern Australia.

2. N. cordifolia (L.) Presl.

Fronds tufted, erect, from a short, suberect rootstock, the wiry fibrous roots often bearing tubers. Stipes 3 to 15 cm long, glabrous or more usually clothed with slender, soft, brown paleae. Fronds 15 to 50 cm long, 2.5 to 5 cm wide, lanceolate, narrowed at both ends, the pinnae numerous, close, sessile, often imbricate, toothed to subentire, oblong, 5 to 8 mm wide, inequilateral, the base cordate, or rounded on the lower side and auricled on the upper side. Sori large, in a row midway between the midrib and the margin; indusium broad, opening toward the apices of the pinnae.

Not uncommon in cultivation in Manila; widely distributed in the Philippines at medium and higher altitudes. Tropics generally.

*3. N. FLOCCIGERA (Blume) Moore, var. MONSTRUOSA Hort.

Tufted, the stipes furfuraceous, the rachis and pinnae furfuraceous and more or less densely villous with weak, spreading or somewhat matted, rather soft, brown hairs. Fronds oblong, 50 to 90 cm in length. Pinnae numerous, lanceolate to oblong-lanceolate, 1 to 2.5 cm wide, deeply and irregularly divided into numerous, unequal, close, often imbricate, linear

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[1] Species indicated by light faced type are introduced, and those marked with an asterisk are cultivated only.

segments which are very variable in size, a few mm to 1 cm or more in length.

Commonly cultivated for ornamental purposes, not spontaneous. A native of the Malay Archipelago, introduced here.

4. **N. biserrata** (Sw.) Schott (*N. acuta* Presl).

Rootstock short, erect, stout, with scaly prop-roots, sending out long stolons, the scales brown, often dense, entire or irregularly ciliate. Fronds erect, or if epiphytic, then pendulous, tufted, the stipes 30 to 60 cm long, nearly glabrous except at the scaly base, the fronds 0.6 to 2 m long or more, 20 to 40 cm wide; pinnae very numerous, linear-lanceolate to lanceolate, usually separated by less than their own breadth, acute or acuminate, entire to slightly toothed or crenate, 1.2 to 2.5 cm wide, the base abruptly narrowed to subtruncate, slightly inequilateral, not auricled, or auricled only on the upper side, glabrous or nearly so. Sori prominent, numerous, distant from the margin, about 2 mm in diameter, the indusium subreniform.

Occasional about boulders and cliffs, in thickets, Masambong to Guadalupe, also commonly cultivated; throughout the Philippines. All tropical countries.

*Var. FURCANS Hort.

Similar to the species, but the pinnae forked or twice-forked above the middle, the lobes spreading.

Commonly cultivated, not spontaneous; an introduced form here. Cultivated in all tropical countries.

5. **N. hirsutula** (Forst.) Presl.

Rootstock erect, stout, densely covered with appressed, dark-brown scales, stoloniferous, also with few prop-roots. Stipes tufted, 10 to 40 cm long, scaly at the base, more or less villous above, becoming nearly glabrous. Fronds 30 to 120 cm long, 8 to 15 cm wide; pinnae numerous, rather close but not at all imbricate, 8 to 14 cm wide, somewhat falcate, acute or acuminate, subentire, toothed or somewhat crenate, the base rounded on the lower side, prominently auricled on the upper side, more or less villous on both surfaces, becoming subglabrous, the sterile pinnae shorter than the fertile ones. Sori marginal or submarginal, about 1 mm in diameter, the indusium peltate or subreniform.

In dry thickets, Santa Mesa, El Deposito, etc., also sometimes cultivated; widely distributed in the Philippines. All tropical countries.

3. DAVALLIA Smith

Mostly epiphytic ferns, usually finely divided, the rootstock creeping, densely covered with narrow, brown, usually chaffy scales. Stipes not jointed to the rootstocks. Fronds ovate to deltoid in outline, in most species at least tripinnate. Sori at or very near the margins, the indusium elongated, attached at the base and side. (In honor of E. Davall.)

Species about 70, in all tropical countries, 10 in the Philippines.

1. **D. denticulata** (Burm.) Mett. (*D. elegans* Sw.).

Rootstock stout, creeping, densely clothed with brown, elongated, very narrow, somewhat flexuous scales. Stipes glabrous, brown, 15 to 40 cm long. Fronds ovate to deltoid, 20 to 60 cm long, the lower pinnae sometimes 25 cm in length, 3- or 4-pinnatifid, the rachis margined toward the apex; ultimate segments of the fertile fronds oblong, prominently toothed, inequilateral, coriaceous, the veins prominent, irregular, oblique. Sori 4 to 15 to a segment, marginal, shorter than the teeth; indusium half-cup-shaped.

Occasionally cultivated in hanging baskets, etc.; widely distributed in the Philippines. Tropical Africa and Asia to Polynesia.

4. ATHYRIUM Roth

Terrestrial ferns with small to large, usually glabrous fronds. Rootstock erect or creeping. Fronds usually clustered, simple, or pinnate to tripinnate, the veins free or anastomosing, the stipes not jointed to the rootstocks. Sori superficial, springing from the sides of the veins or veinlets, single or double, usually elongated, the indusium opening on the side away from the vein.

Species more than 300 in the warmer parts of both hemispheres, 46 in the Philippines.

1. **A. esculentum** (Retz.) Copel. (*Diplazium esculentum* Sw.). Paco (Tag.).

Rootstocks stout, the caudex erect, woody, thickened, bearing many black, wiry roots, the tip clothed with brown, linear scales. Stipes 20 to 50 cm long, smooth or nearly so, green. Fronds 2- or 3-pinnate, 50 to 80 cm long, ovate in outline; about one-half as wide; pinnules lanceolate, acuminate, rather coarsely serrate, or serrate-crenate, 2 to 5 cm long, sessile or very shortly stalked, base truncate, sometimes auricled on one or both sides, glabrous, chartaceous, veins pinnate, extending from the costa to the margin, sterile, their branches bearing sori, anastomosing in pairs from neighboring veins.

Occasional in gardens, Singalon; widely distributed in the Philippines along streams, etc. India to Polynesia.

5. ASPLENIUM Linnaeus

Slender or coarse, terrestrial or epiphytic ferns with simple and entire to pinnate or bipinnate and finely dissected fronds, the stipes not jointed to the rootstock. Sori simple, usually linear and elongated, diagonal on the lower surface of the frond, usually confined to the upper side of the veins. Indusium the shape of the sorus, rarely continuous over the veins, opening obliquely toward the costa, rarely toward the margins. (Greek "without" and "spleen," reference to supposed medicinal properties.)

Species about 440, in all parts of the world, about 45 in the Philippines.

Fronds simple; epiphytes with large entire fronds growing in crowns. 1. *A. nidus*

Fronds pinnate; terrestrial tufted ferns, the pinnae lanceolate, long-acuminate, falcate .... 2. *A. macrophyllum*

1. **A. nidus** L. Bird's Nest Fern.

A large, coarse, epiphytic fern, the fronds entire, radiately arranged, spreading or ascending, coriaceous, shining, narrowly to broadly lanceolate, acuminate, 40 to 120 cm long, 6 to 20 cm wide, base narrowed; veins very numerous, close. Sori numerous, linear, reaching from the midrib about half-way to the margins. (Fl. Filip. *pl. 395.*)

Very commonly cultivated as a hanging plant, variable in size; throughout the Philippines. Tropical Asia and Africa to Polynesia.

2. **A. macrophyllum** Sw.

Rootstock short, covered with linear-lanceolate, acuminate scales. Stipes tufted, rigid, erect, brown, glabrous or nearly so, 3 to 30 cm long. Frond simply pinnate, oblong in outline, 7 to 40 cm long; pinnae opposite or alternate, 2 to 12 on each side, spreading, shortly stalked, subcoriaceous, 2 to 15 cm long, 1 to 3 cm wide, lanceolate, long-acuminate, somewhat falcate, the base inequilateral, cuneate, the margins sharply and irregularly serrate; veins very oblique. Sori in close, long, parallel, oblique lines reaching from the midrib nearly to the margin.

In dry thickets, near Fort McKinley, San Juan del Monte, Masambong, etc.; widely distributed in the Philippines. Tropical Asia to Polynesia.

6. HEMIONITIS Linnaeus

Erect, terrestrial, tufted ferns with entire or lobed fronds, the fertile ones different in shape from the sterile, the stipes not jointed to the rootstock. Veins distinct, copiously anatomosing, the sori continuous along the veins, reticulate, linear, the indusium wanting. (Greek "mule," these ferns originally supposed to be sterile.)

Species about 8, in the tropics of both hemispheres, 1 in the Philippines.

1. **H. arifolia** (Burm.) Moore.

Rootstocks erect, the scales linear-lanceolate. Stipes slender, shining, dark-brown, with scattered, spreading hairs. Fronds dimorphous, the sterile ones elliptic to oblong-elliptic, base deeply cordate, apex rounded, entire, 4 to 10 cm long, 2 to 5 cm wide, their stipes 3 to 10 cm long, the fertile fronds somewhat smaller than the sterile ones, triangular-ovate to elliptic-ovate, obtuse, the base often sagittate, the basal lobes spreading, or deflexed, rounded, very prominently reticulate on the lower surface, the sori covering the veins; stipes longer than in the fertile fronds, 10 to 30 cm in length.

In dry thickets, banks of ravines, etc., Masambong to San Juan del Monte; of local occurrence in the Philippines. Tropical Asia to Malaya.

7. CEROPTERIS Link

Erect, tufted, terrestrial, finely divided ferns from short, creeping or suberect rootstocks, the stipes not jointed to the rootstock. Fronds small to medium size, pinnately divided, the under surface covered with a white or yellow waxy powder. Sori linear to linear-oblong, along the veins but not quite reaching their tips the indusium wanting. (Greek "wax" and "fern.")

Species about 8, chiefly in tropical America, 1 introduced in the Philippines.

1. C. CALOMELANOS (L.) Underw.

Rootstock short, suberect, with few brown scales, the stipes tufted, dark-brown or purplish, polished, stiff, angular, 5 to 25 cm long. Fronds oblong, acuminate, 10 to 50 cm long, bipinnate to tripinnatifid, the pinnae 4 to 15 cm long, lanceolate, the lowest ones the largest, the upper ones gradually shorter, somewhat falcate, stalked, pinnate below, pinnatifid toward their tips, the pinnules oblong, the upper surface glabrous, naked, the lower surface densely covered with a white, waxy powder. Sori linear, forked, eventually nearly covering the lower surface of the frond.

Cultivated for ornamental purposes, also spontaneous and abundant on dry banks, cliffs, etc., Guadalupe to San Juan del Monte. A native of tropical America and Africa, introduced and now thoroughly naturalized here.

8. NOTHOLAENA R. Brown

Terrestrial slender ferns from usually creeping rootstocks, the stipes clustered, not jointed to the rootstock, the fronds rather small, pinnately compound, glandular, hairy, or scaly, the veins free. Sori rounded to oblong, terminal on the veins, often uniting into a continuous submarginal line, naked or partly covered by the unaltered, usually recurved edge of the frond. (Latin "false" and "cloak," from the imperfect indusium.)

Species about 50 in the warmer parts of both hemispheres, 1 in the Philippines.

1. **H. hirsuta** (Poir.) Desv. (*N. densa* J. Sm.).

Rootstocks short, densely covered with narrow brown scales, the stipes rather crowded, slender, 3 to 15 cm long, brown, shining, glabrous or more or less clothed with subulate, fibrillose scales. Fronds 6 to 20 cm long, oblong, 1.5 to 5 cm wide, 3-pinnatifid at the base, the primary pinnae distant, 4 to 7 below the pinnatifid apex, deltoid-oblong, the pinnules oblong, about 1 cm long, the rachis and lower surfaces of the fronds more or less densely fibrillose with brown hairs. Sori usually continuous along the margin.

On dry walls of Intramuros, and in dry thickets San Juan del Monte, etc., of local occurrence in the Philippines. India through Malaya to Australia and Polynesia.

9. CHEILANTHES Swartz

Usually slender, tufted, terrestrial ferns from creeping or ascending, scaly rootstocks, the stipes dark-colored, not jointed to the rootstock, the fronds pinnately divided, the veins free. Sori rounded to oblong, terminal on the veins, at first small and distinct, afterward more or less confluent in a submarginal line. Indusium consisting of the wholly or partly recurved modified margin of the frond. (Greek "lip" and "flower," allusion to position of the sori.)

Species over 100 in the warmer parts of both hemispheres, about 5 in the Philippines.

1. **C. tenuifolia** (Burm.) Sw.

Stipes scattered or tufted, slender, brown, 8 to 20 cm long, shining, naked, or the base slightly fibrillose. Fronds oblong-ovate 8 to 20 cm long, 4 to 10 cm wide, 3-pinnatifid, the lower pinnae distant, opposite, about 2 cm wide, divided to the rachis in the lower part into oblong to linear, entire or toothed lobes or segments, glabrous on both surfaces. Sori rounded or subcontinuous, the indusium narrow, transversely oblong.

In dry thickets, on cliffs, banks, etc., Caloocan to Pasay; widely distributed in the Philippines. Tropical Asia to New Zealand, eastward to Polynesia.

10. ONYCHIUM Kaulfuss

Rootstocks creeping, the stipes tufted, not jointed to the rootstock. Fronds finely pinnately divided, the sterile and fertile segments more or less dissimilar in shape and size, both slender, the veins free. Indusium consisting of the reflexed, somewhat modified margin which reaches to or nearly to the costa. (Greek "claw," reference to the shape of the lobes in some species.)

Species about 5, in the warmer parts of both hemispheres, 2 or 3 in the Philippines.

1. **O. siliculosum** (Desv.) C. Chr. (*O. auratum* Kaulf.).

Rootstock rather stout, covered with lanceolate, brown, spreading scales. Stipes glabrous, pale, sometimes brownish, 10 to 30 cm long. Fronds 15 to 40 cm long, ovate, finely 3- or 4-pinnately divided, the ultimate segments small and narrow, numerous, the sterile ones usually spatulate, and less than 5 mm long, often toothed at the apex, the fertile ones pod-like, linear, entire, acuminate, 5 to 20 mm long, about 1 mm wide, the indusium and sori golden-yellow.

On banks near Fort McKinley; widely distributed in the Philippines. India to China, southward to Malaya.

11. ADIANTUM Linnaeus

Rootstocks creeping or erect, the stipes tufted, usually black and shining, naked, not jointed to the rootstock, erect, simply pinnate, to bi-, tri-, or even quadripinnate, or forked, the leaflets usually inequilateral, dimidiate to cuneate-flabellate or trapezoidal, the outer edge variously toothed or lobed, continuous or jointed on their pedicels, the veins free, forked. Sori rounded to oblong or linear, marginal, terminal on the veins, the indusium consisting of the modified reflexed margin, bearing the sori on its surface. (Greek "dry," from the fact that when plunged in water, the fronds come out dry.)

Species about 190 in both hemispheres, chiefly tropical, about 15 in the Philippines.

1. Fronds simply pinnate.
  2. Leaflets more or less villous or pilose, deeply incised...... 1. *A. caudatum*
  2. Leaflets glabrous or nearly so, not deeply incised.
    3. Leaflets dimidiate, the lower margin straight or forming an angle, the upper one rounded, 1 to 3.5 cm long; sori not continuous. 2. *A. philippense*
    3. Leaflets not dimidiate, 5 to 10 cm long, acute or acuminate, the sori continuous; cultivated only.......................... 3. *A. macrophyllum*
1. Fronds 2- to 4-pinnate; cultivated only.
  2. Leaflets flabellate-cuneate, 1 to 2 cm long............................ 4. *A. tenerum*
  2. Leaflets obliquely ovate to trapezoidal, 4 to 6 cm long. 5. *A. trapeziforme*

1. **A. caudatum** L.

Stipes tufted, 5 to 20 cm long, ascending, erect, or spreading, more or less brown-villous. Fronds linear in outline, 15 to 30 cm long, 1.5 to 3.5 cm wide, simply pinnate, the rachis often elongated and rooting at its apex; leaflets spreading or ascending, dimidiate, oblong, sessile or nearly so, the lower margin straight and entire, the upper one deeply incised, villous. Sori nearly round, on the ends of the lobes.

Common in thickets; widely distributed in the Philippines. Tropical Africa and Asia to Polynesia.

2. **A. philippense** L. (*A. lunulatum* Burm.). Culantrillo (Sp.-Fil.).

Stipes slender, dark-brown, shining, glabrous, tufted, 5 to 20 cm long. Fronds simply pinnate, 10 to 30 cm long, 5 to 8 cm wide; leaflets slenderly stalked, thin, dimidiate, oblong to semilunate in outline, 1 to 3.5 cm long, 0.8 to 1.5 cm broad, the lower margin nearly straight or forming an angle at the insertion of the stalk, the upper margin semicircular, entire or slightly lobed. Sori oblong to linear, as long as the lobes are broad.

Common on wet or damp cliffs and banks in the rainy season, in thickets, etc.; throughout the Philippines. Tropics generally.

*3. A. MACROPHYLLUM Sw.

Stipes black, shining, naked, 15 to 30 cm long. Fronds simply pinnate, 20 to 35 cm long, 10 to 20 cm wide, with about 6 pairs of opposite, lateral, sessile or subsessile pinnae (leaflets) below the terminal one; lower pinnae of sterile fronds 7 to 10 cm long, about 5 cm wide, their bases subhastate, inequilateral, the fertile ones somewhat smaller than the sterile, somewhat falcate, acuminate, the sori linear, continuous or somewhat interrupted, along the margins.

Cultivated for ornamental purposes, not spontaneous. A native of tropical America, introduced here and in other tropical countries.

* A. TENERUM Sw. Alambre (Sp.-Fil.); Maiden Hair Fern.

Stipes stiff, 20 to 30 cm high, naked, black or nearly so, shining. Fronds 25 to 70 cm long, deltoid, 3- or 4- pinnate. Leaflets flabellate-cuneate, thin, 1 to 2 cm long, jointed on their pedicels, the base cuneate, the pedicel attached at about the middle of the base, the upper and outer edge somewhat rounded, slightly or rather deeply lobed, the veins forked, slender. Sori in rounded to transversely oblong patches in shallow hollows terminating the lobes.

Commonly cultivated but not spontaneous. A native of tropical America, introduced here and in other tropical countries.

*5. A. TRAPEZIFORME L.

A stout, coarse fern, the stipes black, shining, 15 to 50 cm high, naked. Fronds 2- or 3-pinnate with a terminal branch 10 to 20 cm long and 2 to 4 large ones on each side, the lowest of which are often branched again. Leaflets subcoriaceous, 4 to 6 cm long, 2 to 3 cm wide, the base nearly a right-angle, the pedicel attached at the angle, obliquely ovate to trapezoidal in outline, the apex subacute, the upper and outer margins slightly lobed. Sori transversely oblong, terminating the lobes.

Cultivated for ornamental purposes, not spontaneous; much the largest species of the genus in the Philippines. A native of tropical America, introduced here and in other tropical countries.

12. PTERIS Linnaeus

Terrestrial ferns, usually tufted, the stipes not jointed to the creeping or erect rootstock. Fronds various, at least pinnate, the lowest pinnae often most developed, especially on the lower side. Veins free or forming areolae along the costa. Sorus on a submarginal strand connecting the ends of the veins, protected by the modified and reflexed continuous margin of the frond; without an extrorse indusium. (Greek name for a fern.)

Species 160 or more, in the tropics of both hemispheres, about 23 in the Philippines.

1. Veins free.
  2. Fronds simply pinnate, lower pinnae shorter than the median ones. 1. *P. longifolia*
  2. Lowest pinnae pinnate, or pinnatifid; pinnules or segments few. 2. *P. ensiformis*
  2. Lowest pinnae bipinnatifid.......... 3. *P. quadriaurita*
1. Veins anastomosing, forming narrow areolae along the costa only; upper part of the frond simply pinnate, the lower pinnae forked and bipinnatifid.......... 4. *P. biaurita*
1. Veins copiously anastomosing; coarse ferns with 3-partite fronds. 5. *P. tripartita*

1. **P. longifolia** L.

Rootstock short, the tips clothed with copious, brown, linear scales. Stipes clustered, 3 to 15 cm long, more or less clothed at the base with linear, spreading, brown scales. Fronds simply pinnate, oblong, 20 to 50 cm long, the lower pinnae shorter than the median ones; pinnae sessile, numerous, 5 to 20 cm long, linear-lanceolate to linear, acuminate, entire, base truncate, subcordate, or auricled, glabrous, subcoriaceous, the terminal one often much longer than the others; veins close, usually once forked. Sorus extending the entire length of the pinnae on both sides.

Crevices of old dry walls, in thickets, on cliffs, etc.; throughout the Philippines. Most tropical and subtemperate countries.

2. **P. ensiformis** Burm.

Rhizome short, creeping, slender, paleaceous. Stipes slender, those of the sterile fronds 5 to 10 cm long, of the fertile ones 10 to 30 cm long, naked, erect, green. Fronds membranaceous, often mottled with gray, the sterile ones 7 to 20 cm long, bipinnatifid or bipinnate, the segments oblong to obovate, dentate, about 1 cm long. Fertile fronds 20 to 40 cm long, simply pinnate, sometimes bipinnate, the segments few, linear, 5 to 15 cm long, the terminal one usually much longer than the few, distant, simple or pinnatifid lateral ones, acute or acuminate, often denticulate at the sterile apex; veins usually forked, free. Sorus continuous.

In shaded thickets, old gardens, etc.; widely distributed in the Philippines. India to China southward to Australia and Polynesia.

3. **P. quadriaurita** Retz.

Roots clothed with soft brown hairs, the tips of the rootstocks paleaceous. Stipes clustered, erect, 15 to 30 cm long, glabrous or nearly so, smooth, green. Fronds oblong, 20 to 60 cm long, simply pinnate or the lower pinnae again compound, the central terminal pinna elongated, acuminate, cut nearly to the rachis into numerous, close, parallel, oblong to linear-oblong, often falcate, obtuse, entire lobes 1 to 2 cm long; lateral pinnae 3 to 8 pairs or more, 8 to 20 cm long, 1.5 to 3 cm wide, deeply cut into numerous lobes like the terminal pinna; veins usually once forked, free, not forming areolae along the costa. Sori continuous along the entire margin or interrupted in the sinuses and toward the ends of the lobes.

Occasional in thickets, sometimes in gardens; widely distributed in the Philippines. All warm countries.

4. **P. biaurita** L.

Roots clothed with soft brown hairs. Caudex stout, erect, somewhat woody, paleaceous at the tip. Stipes clustered, green, somewhat paleaceous near the base, otherwise glabrous, 20 to 60 cm high. Fronds oblong, 30 to 60 cm long, simply pinnate above, the basal pinnae usually once forked, the terminal pinna usually longer than the lateral ones; pinnae 6 to 12 pairs, lanceolate, 9 to 20 cm long, 2.5 to 4 cm wide, acuminate, cut nearly to the costa into numerous, oblong, obtuse, entire, somewhat falcate, spreading lobes, the sinuses often as wide as, or wider than the lobes; veins anastomosing along the costa forming a single row of narrow areolae, those in the lobes free, usually once forked. Sorus continuous along the margin or interrupted at the sinuses and apices of the lobes.

In dry thickets Masambong, Guadalupe, etc.; widely distributed in the Philippines. All tropical countries.

5. **P. tripartita** Sw.

A coarse tufted fern from a stout, short, erect caudex. Stipes 30 to 100 cm high, stout, erect, smooth, green. Frond glabrous, tripartite, spreading from the apex of the stipe, the central part simply pinnate, up to 60 cm long, the pinnae numerous, 15 to 25 cm long, 2 to 3 cm broad, oblong-lanceolate, acuminate, cut half-way or more to the costa into oblong, falcate, obtuse lobes, the sterile ones slightly toothed; lateral divisions usually branched, similar to the middle one but shorter; lateral veins fine, distinctly anastomosing. Sori usually continuous around the sinus but not reaching to the ends of the lobes.

Not uncommon in gardens, brought in from the provinces; widely distributed in the Philippines. Tropical Africa and Asia to Polynesia and Australia.

13. POLYPODIUM Linnaeus

Rootstocks creeping or erect, the stipes scattered, jointed to the rootstock. Fronds simple and entire, pinnatifid, or pinnate, rarely more compound, glabrous, scaly, or hairy, the veins free or anastomosing. Sori round, oblong, or linear, superficial or sunk in cavities, usually very numerous, dorsal. Indusium none. (Greek "many" and "feet.")

A very large, polymorphous genus, with over 800 species, in both hemispheres, mostly tropical, few in temperate regions, about 115 in the Philippines, a single one in our area, aside from casual species like *P. punctatum* which are occasionally brought in from the provinces.

1. **P. phymatodes** L.

A rather coarse fern, usually fragrant in drying. Rootstock widely creeping, stout, often glaucous, bearing few, scattered, deciduous, fibrillose scales, becoming nearly glabrous. Stipes 5 to 30 cm high, erect, glabrous. Stipes 5 to 30 cm high, erect, glabrous, shining. Frond exceedingly variable, coriaceous, glabrous, sometimes simple, entire, and lanceolate to oblong, obtuse to acuminate, 5 to 20 cm long, or more often pinnatifid into segments similar in shape and size to the simple fronds above described, reaching a length of 50 cm, the sinuses rounded, extending nearly to the midrib, sometimes only 3-lobed; veins indistinct. Sori large and prominent, in two rows on each lobe, or scattered, brown, round to elliptic, 4 to 5 mm in diameter.

On dry ledges San Juan del Monte, and occasional on walls and trees in Manila; throughout the Philippines. Tropical Africa through Asia to Malaya, Australia, and Polynesia.

14. CYCLOPHORUS Desvaux

Epiphytic, more rarely terrestrial ferns, the rootstocks creeping, scaly, the stipes not jointed to the rootstock. Fronds coriaceous, simple, usually elongated, entire, both surfaces with few to many, scattered or densely arranged stellate hairs, the veins anastomosing, not apparent. Sori round, sometimes hidden in the tomentum, entirely covering the lower surface or parts of the lower surface of the fertile fronds, the sterile fronds usually different in shape from the fertile ones. Indusium none. (Greek "circle" and "to bear," allusion to the round sori.)

Species about 70 in all tropical countries, about 10 in the Philippines.

1. **C. adnascens** (Sw.) Desv.

An epiphytic fern, the slender wiry rootstock widely creeping, branched, densely covered with appressed brown scales. Stipes 2 to 5 cm high, puberulent. Fronds dimorphous, coriaceous, oblong to lanceolate, 4 to 10 cm long, 1 to 1.5 cm wide, the fertile ones linear-lanceolate, narrower, 10 to 20 cm long, both surfaces slightly pubescent or nearly glabrous, the veins obsolete. Sori distinct but closely crowded, densely pubescent between them, occupying the entire lower surface, except the midrib, of the upper one-half to two-thirds of the frond.

Occasional on trees, Singalon, Paco, etc.; widely distributed in the Philippines. Tropical Asia to Polynesia.

15. DRYNARIA J. Smith

Coarse, usually epiphytic ferns with very stout, densely paleaceous, creeping rootstocks. Fronds of two kinds very dissimilar in shape and appearance, (1) sterile humus-gathers, at first green, soon becoming brown, sessile, coriaceous, concave, shining, variously lobed, and (2) ordinary fronds, large, green, deeply simply pinnately lobed; veins copiously anastomosing and emitting free included veinlets. Sori numerous, dorsal, borne on the veins, exindusiate. (Greek "oak-like," from the resemblance of the sterile humus-gathering leaves to the leaves of the oak.)

Species about 15, tropical Asia to Polynesia, 4 in the Philippines.

Sterile bract-like humus-gathering fronds large, 20 to 30 cm in length; lower lobes of the ordinary fronds little or not at all reduced. 1. *D. quercifolia*

Sterile bract-like humus-gathering fronds small, not exceeding 6 cm in length; lower lobes of the ordinary fronds much reduced.. 2. *D. descensa*

1. **D. quercifolia** (L.) Bory.

Rootstock very stout, somewhat fleshy, very densely covered with narrow brown scales about 1 cm long. Humus-gathering fronds brown and shining when mature, ovate, coriaceous, somewhat imbricate, 20 to 30 cm in length, 15 to 20 cm wide, concave, shallowly lobed below, deeply so above. Stipes of the ordinary fronds stout, 15 to 30 cm long, narrowly winged, the fronds firm, oblong or ovate-oblong, 40 to 90 cm long, the lobes 8 to 20, ascending, cut nearly to the midrib, 2 to 4 cm wide. Sori in regular rows, one row on each side of each main vein running to the margin.

Occasional on trees, old walls, etc., sometimes cultivated; throughout the Philippines. Southern Asia to Australia and Polynesia.

2. **D. descensa** Copel.

Rootstocks stout, fleshy, densely covered with brown scales with long caudate tips. Humus-gathering fronds ovate to oblong-ovate, coriaceous, concave, imbricate, brown and shining, 5 to 6 cm long, base deeply cordate, subentire, or lobed above. Stipes of the ordinary fronds 5 to 25 cm long, narrowly or broadly winged, the fronds oblong, 25 to 40 cm long, cut nearly to the rachis into very distant, alternate, oblong-lanceolate, ascending or spreading lobes 8 to 13 cm long, the lobes 7 to 12 on each side, much narrower than the sinuses, the lower lobes much reduced. Sori in regular rows or somewhat scattered.

On dry ledges and on trunks of small trees in ravines opposite Guadalupe; of local occurrence in Luzon. Endemic.

16. **ACROSTICHUM** Linnaeus

Very coarse tufted ferns from thick suberect rootstocks, the stipes not jointed to the rootstock. Frond large, simply pinnate, the pinnae with a prominent midrib, the veinlets distinct, freely anastomosing, the upper pinnae in part or whole fertile. Sporangia densely covering the backs of the fertile pinnae, except the midrib; indusium none. (Greek "tip" and "row," allusion to the upper pinnae bearing the sori.)

Species 3 or 4 in the tropics of both hemispheres, 1 in the Philippines.

1. **A. aureum** L. Lagolo (Tag.).

Rootstock stout, woody, scaly. Stipes clustered, stout, glabrous, 30 to 50 cm long. Fronds 50 to 200 cm long, the pinnae oblong, coriaceous, 20 to 50 cm long, 4 to 6 cm wide, base stipitate, apex obtuse or retuse, sometimes mucronate. Fertile upper pinnae somewhat smaller than the lower sterile ones, the lower surface densely covered with the brown sporangia.

Common in open brackish swamps; throughout the Philippines near the sea, occasional in suitable habitats inland. Tropics generally.

2. PARKERIACEAE (WATER FERN FAMILY)

Aquatic or subaquatic succulent plants growing in shallow water or in mud, the rootstock short, erect. Fronds pinnately divided, somewhat dimorphous, the veins anastomosing, but more copiously in the sterile than in the fertile fronds. Sporangia dorsal, not gathered into sori, scattered irregularly on the few longitudinal veins of the fertile fronds, parallel to the margins and midrib, the indusium none, but the margins of the fronds broadly recurved, hardly changed in texture, the edges meeting with the midribs and quite enclosing the sporangia when young. Annulus vertical, broad, incomplete, short, or interrupted by the very short stalk of the sporangium.

A single genus and species, in all tropical countries.

1. CERATOPTERIS Brongniart

Characters of the Family as given above. (Greek "horn" and "fern" allusion to the antler-like form of the fertile fronds.)

1. **C. thalictroides** (L.) Brongn.

Stipes tufted, thick, fleshy, filled with large air-cells, naked, 5 to 30 cm long. Sterile fronds floating or more often erect, glabrous, thin and flaccid in texture, 15 to 60 cm long, 2- or 3-pinnatisect, the ultimate segments linear to lanceolate, rarely oblong-ovate, 1 to 6 cm long, the fronds of young plants simple or more or less incised. Fertile fronds about as large as the sterile ones, the ultimate segments linear, 1 to 5 cm long, 2 mm wide or less, pod-like.

In open wet places, in mud and shallow water, occasional; widely distributed in the Philippines. All tropical countries.

3. SCHIZAEACEAE (CLIMBING FERN OR NITO FAMILY)

Erect or twining terrestrial ferns from erect or horizontal rootstocks. Sporangia 1 or 2, or numerous, in the axils of imbricating, clasping indusia forming spikes along the margins of the fertile segments or arranged in 2 to 4 regular, close rows, covering one side of close distichous spikes at the apex of the fertile fronds or segments. Annulus a complete transverse ring at or just below the apex of the sporangium. Fertile teeth or segments of the frond much contracted, the sterile ones larger.

Genera 4, species 120 in the warmer parts of both hemispheres, 2 genera and about 10 species in the Philippines.

1. LYGODIUM Swartz

Much elongated, slender, terrestrial ferns, the rachis twining, the pinnae stalked, opposite, the pairs on very short, alternate, primary petioles (really dwarfed branches), which are often inconspicuous or wanting, the pinnae pinnate, bipinnate, or dichotomous and somewhat radiate, the veins free or anastomosing. Sporangia borne on special teeth or spikes arranged in rows either on the margins of normal pinnae or on reduced fertile pinnae.

Species about 30 in the warmer parts of both hemispheres, 8 in the Philippines. (Greek "twining.")

Fertile pinnate more compound than the sterile ones; very slender ferns, the sterile segments mostly 3 to 8 mm wide.................... 1. *L. japonicum*

Fertile pinnae not more compound than the sterile, the latter with segments mostly exceeding 1 cm in width... 2. *L. flexuosum*

1. **L. japonicum** (Thunb.) Sw. Nito, Nitong-puti (Tag.).

A very slender twining fern, 1 to 3 m in length, somewhat pubescent or nearly glabrous, the dwarfed branches 2 to 4 mm long. Sterile pinnae 8 to 15 cm long, rarely longer, the rachis very narrowly winged, pinnate, the pinnules 2 to 5 on each side, the upper ones simple, sessile, often subconfluent, entire, the intermediate ones somewhat hastate, and the lowest ones stalked, pinnate or 2-pinnate, all oblong to linear, 1.5 to 8 cm long, 3 to 8 mm wide. Fertile pinnae smaller than the sterile ones, sometimes tripinnate, the segments relatively broader and shorter.

Occasional in open dry grasslands, dry thickets, etc., Diliman, San Francisco del Monte, etc.; widely distributed in the Philippines. Japan and Korea to India, southward to Australia.

2. **L. flexuosum** (L.) Sw. Nito (Tag., Vis.).

A twining somewhat pubescent fern reaching a length of several meters, the dwarfed branches short or none, the stems somewhat ridged. Sterile pinnae pinnate, mostly 15 to 20 cm long, the rachis usually narrowly winged, the upper pinnules sessile, subconfluent, the intermediate ones hastate and usually more or less cordate, the lowest ones usually pinnate, the segments oblong to lanceolate, obtuse to acuminate, 4 to 10 cm long, mostly 10 to 18 mm wide, very finely serrate. Fertile fronds about the same size as the sterile ones, not more compound, the segments about as large as the sterile ones.

Occasional in thickets, Masambong, San Francisco del Monte, Diliman, etc.; widely distributed in the Philippines. India to southern China southward to Australia.

4. MARSILEACEAE (MARSILEA FAMILY)

Slender plants growing in mud or in shallow water, the rootstocks creeping, the leaves long-petioled, 4-folialate, circinate in vernation, the leaflets sessile, obovate-cuneate, the nerves radiate-parallel. Sporangia borne in closed, short-stalked sori or sporocarps close to the rootstocks, on very reduced and modified leaves. Spores of two kinds, borne in the same sporocarp, macrosporangia each containing one macrospore, and microsporangia, each containing numerous microspores.

Genera 3, species 75, warmer parts of both hemispheres, a single genus and 1 or 2 species in the Philippines. Entirely different from all other ferns in habit.

1. MARSILEA Linnaeus

Characters of the Family as given above. (In honor of G. Marsigli, an early Italian botanist.)

Species 56, in most warm countries, 1 or 2 in the Philippines.

1. **M. crenata** Presl.

Rootstock slender, creeping, branched, the stipes of the sterile fronds 2 to 12 cm high, slender; leaflets 4, obovate-cuneate, glabrous, 10 to 15 cm long, or smaller in terrestrial forms, rounded and slightly crenate or subentire at the apex, the lateral margins entire, straight, cuneately narrowed to the sessile base. Sporocarps covered with brown hairs when young, becoming glabrous or nearly so, oblong, about 3 mm long, rounded, slightly compressed, somewhat clustered or solitary, their pedicels 5 mm long or less, the upper basal tooth prominent.

In muddy places, shallow pools, etc., Caloocan and Santa Ana; widely distributed in the Philippines. Endemic.

5. LYCOPODIACEAE (CLUBMOSS FAMILY)

Perennial, erect, prostrate, or pendulous, simple or branched plants with fibrous roots, the stems usually produced. Leaves small, simple, 1-nerved, entire or toothed, continuous with the stem, mostly very numerous and densely arranged in many rows, rarely distichous. Sporangia in the axils of the leaves or crowded in terminal, often elongated spikes at the ends of the branches, in the axils of bracts (modified leaves), coriaceous, compressed, 1-celled, opening by a slit down the back. Spores all of one kind, minute, globose, granulated.

Genera 2, species 150 or more all parts of the world, 1 genus in the Philippines.

1. LYCOPODIUM Linnaeus

Characters of the Family as given above. (Greek "wolf" and "foot.")

Species 150 or more in all parts of the world, about 20 in the Philippines.

None of the following species grow naturally within our area, but all are indigenous Philippine forms found in Manila in cultivation.

1. Leaves little different from the sporangia-bracts and passing into them gradually.
    2. Stout, the leaves linear-lanceolate, spreading, 1 to 1.5 cm long. 1. *L. squarrosum*
    2. Slender, the leaves appressed, less than 1 cm long........ 2. *L. carinatum*
1. Leaves very different from the bracts, the sporangia in distinct, slender, elongated, simple, forked spikes.
    2. Leaves ovate, 5 to 8 mm long... 3. *L. filiforme*
    2. Leaves lanceolate, 1 to 1.5 cm long, less than 5 mm wide. 4. *L. phyllanthum*

1. L. squarrosum Forst.

A stout pendulous epiphyte 40 to 70 cm long, once or twice dichotomously forked, the stems about 1 cm in diameter. Leaves very numerous, crowded, spreading, or somewhat ascending, lanceolate, acuminate, shining, 1 to 1.5 cm long, less than 2 mm wide, entire, the midrib distinct, the spikes stout, 5 to 12 cm long, the bracts leaf-like and little smaller than the leaves.

Occasionally cultivated in hanging baskets, etc.; widely distributed in the Philippines. India to the Mascarene Islands through Malaya to Polynesia.

2. L. carinatum Desv.

A slender pendulous epiphyte 40 to 80 cm in length, several to many times dichotomously branched, the stems 2 to 3 mm in diameter (without the leaves) the branches somewhat 4-angled by the 4-ranked leaves or bracts. Leaves rather close, ascending, lanceolate, acute or acuminate, 6 to 8 mm long. Spikes elongated, square, 3 to 4 mm in diameter, up to 40 cm in length, simple or forked, the bracts 4 to 5 mm long, prominently keeled.

Occasionally cultivated in hanging baskets, etc.; of local occurrence in the Philippines. India to Formosa, southward to Malaya and Polynesia.

3. L. filiforme Roxb.

Slender pendulous epiphytes, the stems 2 mm in diameter or less, usually several times dichotomously branched. Leaves ovate, acute, 5 to 8 mm long, 3 to 6 mm wide, acute, spreading, laxly disposed. Spikes very slender, simple or dichotomously branched, 5 to 20 cm long, less than 2 mm in diameter, the bracts ovate, about 1 mm long, but little longer than the sporangia.

Occasionally cultivated in hanging baskets, etc.; widely distributed in the Philippines, but local. India to Malaya.

4. **L. phyllanthum** Hook. & Arn.

A pendulous, dichotomously forked epiphyte 40 to 70 cm in length, the stems rather stout, 4 to 5 mm in diameter. Leaves lanceolate, very numerous, spreading or ascending, 1 to 1.5 cm long, up to 5 mm in width. Spikes slender, simple or dichotomously forked, 8 to 15 cm long, about 2 mm in diameter, the bracts ovate, imbricate, keeled, about 1.5 mm long.

Occasionally cultivated in hanging baskets, etc.; widely distributed in the Philippines. India to Malaya, Polynesia, and the Hawaiian Islands.

6. SELAGINELLACEAE (SELAGINELLA FAMILY)

Prostrate, ascending, or erect, delicate to coarse, subsimple to copiously branched, annual or perennial plants, the branches usually in one plane. Leaves small, spaced to closely imbricated, with a central vein, usually in four rows and of two kinds, the two rows of the lower plane larger and more spreading than the two rows of the upper plane which are usually appressed to the stem. Spikes usually square, of four rows of closely imbricated bracts more or less similar to the leaves, either all similar, or two rows with bracts larger than the other two. Sporangia minute, round, membranaceous, 1-celled, in the axils of the bracts, forming dense spikes at the ends of the leafy branches, the microspores very minute, numerous, the macrospores larger, few to many.

A single cosmopolitan genus.

1. SELAGINELLA Linnaeus

Character of the Family as given above. (Diminutive of *Selago*, an ancient name of *Lycopodium* and which these plants greatly resemble.)

Species more than 400 in all parts of the World, but chiefly tropical, 50 or more in the Philippines.

1. Stems prostrate, simple to sparingly branched, less than 5 cm high. 1. *S. belangeri*
1. Stems erect or suberect, copiously branched, mostly 10 to 15 cm high.
  2. Leaves of the lower plane about 3 mm long; spikes about 3 mm thick. 2. *S. myosuroides*
  2. Leaves of the lower plane about 2 mm long; spikes about 2 mm thick. 3. *S. barbata*

1. **S. belangeri** (Bory) Spring.

A slender, prostrate, trailing annual 5 cm long or less, often forked at the base, pinnate, the suberect branches usually less than 4 cm high, simple or little branched. Leaves of the lower plane below the tips of the branches spaced, spreading, ovate, acute, about 2 mm long, pale-green, membranaceous, inequilateral, cordate and ciliate at the base, imbricated over the stem on the upper side, those toward the tips of the branches densely arranged. Leaves of the upper plane about one-half as large, ovate, acuminate, base cordate. Spikes about 1 cm long, 3 mm thick, the smaller bracts in the same plane with the larger leaves, the bracts of the upper plane as large as the leaves of the lower plane, closely imbricated, ciliate, somewhat spreading.

On damp cliffs, along streams and on banks of old rice paddies, San Pedro Macati to Masambong, July-Dec.; widely distributed in the Philippines. India to Australia.

2. **S. myosuroides** (Kaulf.) Spring.

A slender, erect or ascending annual, 5 to 15 cm high, copiously pinnate, the branches compound, the base of the stem with rootlets. Leaves of the lower plane spaced, membranaceous, oblong-lanceolate, acute, about 3 mm long, slightly inequilateral, light-green, those of the upper plane 2 mm long or less, lanceolate, acuminate, appressed. Spikes 1 cm long or less, about 3 mm thick, the bracts of the upper plane closely imbricated, oblique, lanceolate, as long as and in the same plane as the larger leaves.

On damp banks, shaded ravines, etc., Guadalupe to San Juan del Monte and Masambong, Aug.-Feb.; widely distributed in the Philippines. Endemic.

3. **S. barbata** Spring.

An erect or suberect, somewhat tufted, branched annual from the slightly prostrate base, 6 to 15 cm high, with rootlets at the base only, pinnate, the branches ascending, rather close, the branchlets numerous. Leaves of the lower plane spaced on the stem, close on the branches, ovate, acute, ascending, about 2 mm long, subequilateral, the base broadly rounded and somewhat ciliate on the margins, imbricated on the upper side over the stem, the leaves of the upper plane about one-half as large, obliquely ovate, acute, appressed. Spikes about 5 mm long, 1.5 mm thick, the bracts ovate, acuminate, keeled on the back.

On damp cliffs, banks of streams, etc., Masambong to San Pedro Macati, Aug.–Oct.; of local occurrence in Luzon. Endemic.

A few forms of uncertain origin are found in cultivation, but these have not been considered here.

SPERMATOPHYTA. Plants Producing Flowers and Seeds

Class I. **GYMNOSPERMAE**: Ovules naked, not borne in closed ovaries, the stigma none.

7. CYCADACEAE (Cycas or Pitogo Family)

Stout erect shrubs or trees with simple, rarely forked stems, with numerous, long, pinnate leaves crowded at the ends. Leaflets numerous, somewhat falcate, linear, coriaceous, entire. Flowers dioecious, the males in dense terminal, large, peduncled cones, composed of numerous closely imbricate, cuneate, long-acuminate, scales, bearing beneath many crowded, 1-celled anthers. Female inflorescence consisting of elongated, flat, densely brown-woolly carpellary leaves (carpophores), more or less crowded at the apex of the stem, somewhat dilated above into an entire, toothed, or pectinate blade. Flowers consisting of ovules only, 1 to 5 in distant notches on each side of the stalk of the carpophyll. Seeds ellipsoid.

Genera 9, species about 90, in the tropics and south temperate zone of both hemispheres, a single genus and 3 or 4 species in the Philippines.

1. CYCAS Linnaeus

Characters of the Family as given above. (The ancient Greek name.)

Species about 16, tropical Asia to Japan southward to Australia and Polynesia, 3 or 4 in the Philippines.

Leaflets about 5 mm wide, strongly revolute, pubescent on the lower surface.
1. *C. revoluta*

Leaflets about 1 cm wide, flat or nearly so, entirely glabrous.
2. *C. circinalis*

*1. C. REVOLUTA Thunb.

Trunk stout, cylindric, marked with prominent scars, simple, with us usually not exceeding 1 m in height. Leaves very numerous, crowded, spreading, 0.5 to 1.5 m long, the leaflets very numerous, close, linear, sharply and slenderly acuminate, those in the middle up to 18 cm long, about 5 mm wide, toward the base gradually shorter, the basal few reduced to sharp spines, coriaceous, revolute, glabrous on the upper surface, pubescent beneath.

Commonly cultivated in Manila and in some of the larger towns in the Philippines, rarely or never flowering here. A native of China and Japan, now cultivated in many other countries.

2. **C. circinalis** L. Pitogo (Tag.); Oliva (Sp.-Fil.).

Trunk stout, with us rather short, but in some regions said to attain a height of 12 m, and up to 50 cm or more in diameter, usually unbranched. Leaves 1.5 to 2.5 m long, crowded at the apex of the trunk, the leaflets 20 to 30 cm long, about 1 cm wide, flat or nearly so, glabrous and shining, falcate, 45 to 90 or more on each side of the midrib, sharply and slenderly acuminte, the lower ones reduced to spines. Male cones terminal, elongated-cylindric to ovoid-cylindric, up to 60 cm in length. Carpellary leaves numerous, about 30 cm long, densely rusty-tomentose, fimbriate-pectinate at the apex, acuminate. Fruit ovoid to ellipsoid, 3 to 5 cm long.

Occasionally cultivated, fl. May; widely distributed in the Philippines. Tropical Asia to Japan, southward to New Guinea and Polynesia.

The *Gymnospermae* are represented in the Philippines by the following additional families: *Pinaceae*, *Taxaceae*, and *Gnetaceae*, and all are treated by Foxworthy under the title "Philippine Gymnosperms" *Philip. Journ. Sci.* 6 (1911) *Bot.* 145–177. The *Pinaceae* is represented in Manila by immature, introduced and cultivated species of the genera *Cryptomeria* and *Araucaria*, and by rare specimens of *Cupressus*, the latter locally known as *ciprés*.

Class II. **ANGIOSPERMAE**: Ovules borne in closed ovaries, the stigma always present.

Subclass I. **MONOCOTYLEDONEAE**: Plants producing seeds with but a single cotyledon.

8. TYPHACEAE (CAT-TAIL FAMILY)

Perennial erect marsh herbs with simple, erect, linear, entire leaves which sheath the base of the stem. Flowers small, densely crowded in long cylindric spikes, often intermixed with capillary bracteoles with dilated tips, the male flowers superposed above the female ones. Perianth of capillary hairs or none in the male flowers. Stamens 1 or more. Ovary very small, on a long capillary stipe, narrowed into a capillary style. Fruit very minute, the pericarp membranaceous, indehiscent or splitting laterally.

A single genus, in most warm and tropical countries.

1. TYPHA Linnaeus

Character of the Family as given above. (The old Greek name.)

Species 9 with some subspecies and many varieties in all parts of the world, 2 in the Philippines.

1. **Typha angustifolia** L. subsp. **javanica** Schnizl. Lampacanay (Vis.); Balangot (Tag.); Cat-tail.

Erect, glabrous, up to 2 m high. Leaves long, 10 to 12 mm wide. Spikes exserted, cylindric, the female one when mature brown, 12 to 20 cm long, up to 2 cm in diameter.

Locally abundant in low wet places, and shallow stagnant fresh water; widely distributed in the Philippines. The subspecies extends from the Mascarene Islands to Ceylon eastward and southward to New Guinea, the species widely distributed in Europe, Asia, and North America.

9. PANDANACEAE (PANDAN FAMILY)

Erect dioecious shrubs or trees, usually with prop-roots, or vines climbing by aerial roots, the leaves 3-ranked, spirally arranged, narrow, elongated, acuminate, the margins and midribs usually spinously toothed. Inflorescence axillary or terminal, simple or branched, clothed with leafy spathes or bracts. Flowers small, crowded on a catkin-like spadix. Perianth none. Male flowers with many stamens, the filaments free or united. Female flowers with a 1-celled ovary which is free or connate with those of contiguous flowers. Ovules 1 or many. Fruit a globose, oblong, ellipsoid, or cylindric mass of usually many, free or somewhat connate, 1- to many-celled, woody, usually angular drupes, or somewhat berry-like and fleshy.

Genera 3, species over 300 in the tropics of the Old World, all genera and about 80 species known in the Philippines.

1. PANDANUS Linnaeus filius

Erect, branched, rarely simple shrubs or trees with prop-roots, the stems usually prickly. Leaves numerous, crowded at the ends of the branches. Inflorescence terminal. Fruit a small or large, globose to oblong or elliptic syncarp of few to many, woody, angled, truncate, rounded, or pointed drupes. (From the Malay name.)

Species more than 200, about 35 known from the Philippines.

1. **P. tectorius** Sol. (*P. odoratissimus* L. f.). Pandan. Pangdan (Tag., Vis., Il.); Screw Pine.

An erect branched shrub or small tree 3 to 5 m high, the trunk bearing few to many prop-roots. Leaves spirally crowded toward the ends of the branches, glaucous, linear-lanceolate, slenderly long-acuminate, up to 1.5 m long, 3 to 5 cm wide, coriaceous, the margins and midrib beneath toward the apex, armed with sharp spiny teeth that point toward the apex of the leaf. Male inflorescence somewhat pendulous, up to 0.5 m long, the bracts lanceolate, acuminate, white or nearly so, the flowers very numerous, fragrant, densely disposed. Fruit solitary, pendulous, ellipsoid to globose-ellipsoid, usually about 20 cm long, each composed of from 50 to 75 or more, obovoid, somewhat angular, fibrous-fleshy drupes 4 to 6 cm long, which are narrowed below, truncate at the apex, the stone 4- to

10-celled, slightly sulcate between the cells at the apex, at maturity yellowish-red.

Very common along the seashore and along tidal streams, Pasay, etc., fl. June–Sept., and probably in other months; throughout the Philippines near the sea. Mascarene Islands to southern Asia, Malaya, Australia, and Polynesia.

Some horticultural forms are cultivated in Manila, but their botanical status is uncertain as flowers and fruits are unknown. A common form with shining, uniformly green, not at all glaucous leaves, is probably only a variety of *Pandanus tectorius* Sol.; another form quite similar to this but with some of the leaves variegated with white, or the upper ones nearly or quite white is *Pandanus veitchii* Hort., which probably originated in Polynesia, and which may also well be only a variety of *P. tectorius* Sol.

10. POTAMOGETONACEAE (PONDWEED FAMILY)

Herbs growing in fresh or salt water, usually submerged, from slender rootstocks. Leaves usually distichous, opposite or alternate, submerged or floating, entire, linear to ovate, base sheathing. Flowers very small, perfect, in fascicles or spikes. Perianth none, or of 4 small sements. Stamens 2, sessile or subsessile. Ovary of 1 to 4 or more carpels, each 1-ovuled. Fruit a small, 1-seeded, cylindric or ovoid achene.

Genera 9, species about 115, in fresh or salt water in all parts of the world, 2 or 3 genera and 6 or 7 species in the Philippines.

Spikes cylindric, many-flowered; stamens 4; perianth of 4 small segments; plants of fresh water.. 1. *Potamogeton*

Flowers 2 to 6 within the leaf-sheath; stamens 2; perianth none; plants of salt water with linear leaves.. 2. *Ruppia*

1. POTAMOGETON Linnaeus

Perennial or annual, submerged or floating aquatic herbs, the stems weak, flaccid, branched, leafy. Leaves opposite or alternate, all submerged and sessile or the upper ones floating, often petioled, linear to oblong or elliptic. Spikes cylindric, terminal, mostly densely many-flowered, the scape from a membranaceous spathe. Flowers perfect. Perianth-segments 4, concave, green (dilated-winged connectives of the anthers of some authors). Anthers 4, sessile on the segments. Carpels 4, sessile 1-celled, 1-ovuled. Fruit small coriaceous or spongy, drupe-like. (From the Greek "river" and "neighbor" in reference to the habitat of most species.)

Species about 87, with many varieties, in all parts of the world, about 4 in the Philippines.

1. P. malainus Miq.

Stems elongated, slender, up to at least 2 m in length. Submerged leaves thin, lanceolate or oblong-lanceolate, mostly long-petioled, both ends acute, apex mucronate, 6 to 15 cm long, 1 to 1.5 cm wide, the midrib thick, the nerves slender, the margins of the younger leaves crenulate-undulate. Peduncles about as long as the leaves. Spikes slender, cylindric, up to 3.5 cm long, interrupted, about 5 mm in diameter.

Abundant in the Mariquina River near Pasig, fl. Jan.–Apr.; widely distributed in the Philippines. India to China, Formosa, Java, Sumatra, and Borneo, also reported from the West Indies.

2. RUPPIA Linnaeus

Slender, branched, submerged plants growing in brackish water. Leaves very slender, elongated, filiform, entire, the bases with broad sheaths. Flowers small, perfect, 2 to 6 together within the leaf-sheath on a short peduncle which elongates after flowering. Perianth none. Anthers 2, sessile, opposite. Carpels 4 or more and sessile, 1-ovuled, in fruit long-stipitate, ovoid, beaked. (In honor of H. B. Rupp, a German botanist.)

A single variable species in brackish water in most warm and tropical regions.

1. **R. maritima** L. var. **rostrata** Agardh. Digman-palay (Tag.).

Stems very slender, branched, up to 50 cm in length. Leaves thin, linear, entire, flat, 5 to 7 cm long, less than 1 mm wide, the sheaths auriculate. Flowers very small. Peduncles elongated after flowering, straight, slender, 1 cm long or more. Achenes obliquely ovoid, beaked, about 2.5 mm long, and slenderly pedicelled, 4 or 5 or more subumbellately arranged on each peduncle.

In brackish water, fish-ponds at Malabon, fl. Dec.–Feb., and probably in other months; of very local occurrence in the Philippines. In most warm and tropical countries.

11. NAJADACEAE (NAJAS FAMILY)

Slender, branched, submerged plants, the leaves numerous, small, linear, toothed, sheathing at the base, in pairs, sessile. Flowers small, axillary, monoecious, rarely dioecious. Male flowers naked or included in a small, spathe, the perianth 2-lobed, adnate to the solitary anther. Female flowers naked, rarely included in a spathe, the perianth none, the ovary 1-celled, 1-ovuled. Fruit small, included in the leaf-sheaths, the pericarp thin, adherent to the seed.

A single genus.

1. NAJAS Linnaeus

Characters of the Family. (From the Greek "water nymph.")

Species 32, with many varieties, in all parts of the world, 3 in the Philippines.

1. **N. graminea** Del.

A slender branched plant 20 to 60 cm in length. Leaves linear, numerous, opposite, 1 to 2 cm long, finely toothed, inflated and with toothed auricles at the base. Flowers small, naked, fascicled, monoecious; anthers 4-celled. Fruit oblong-ellipsoid, about 2 mm long.

In stagnant fresh water, fl. March–May and probably in other months; widely distributed in the Philippines. Northern Africa to Japan south to Australia.

12. HYDROCHARITACEAE (EEL GRASS FAMILY)

Aquatic, fresh or salt-water herbs, with simple, undivided leaves. Flowers monoecious or dioecious, enclosed in an entire or 2-leaved spathe. Sepals 3, green or petaloid. Petals 3 or none. Stamens 3 to 15; anthers erect. Ovary inferior, the placentas parietal or projecting; styles or style-arms 3 to 12. Fruit rarely dehiscent, membranaceous or fleshy, few- to many-seeded.

Genera 14, species about 60; 6 genera and 8 to 10 species in the Philippines.

1. Fresh-water herbs.
  2. Stems branched, leafy, elongated, the leaves whorled............ 1. *Hydrilla*
  2. Stemless, or with stolons only.
    3. Leaves very long and narrow, ribbon-like; perianth single. 2. *Vallisneria*
    3. Leaves broad, the floating ones up to 20 cm in width; perianth double. 3. *Ottelia*
1. Salt-water herbs; stems slender, creeping.
  2. Stamens 3.. 4. *Halophila*
  2. Stamens 6.. 5. *Thalassia*

1. HYDRILLA Richard

An elongated, branched, leafy, submerged, herb. Leaves short, in whorls, or the lower ones opposite. Male flowers solitary, shortly pedicelled, in a subglobose, sessile, muricate spathe; sepals 3, ovate, green; petals 3, oblong or wedge-shaped; stamens 3, the anthers large, reniform. Female flowers 1 or 2, sessile, in a tubular, 2-toothed spathe, the perianth as in the staminate flowers but the segments narrower; ovary produced beyond the spathe in a filiform beak, 1-celled; styles 2 or 3. Fruit subulate, smooth or muricate, seeds 2 or 3, oblong. (From the Greek, with reference to its habitat.)

A monotypic genus.

1. **H. verticillata** (Roxb.) Royle. Digman (Tag.).

Submerged in still or slowly running water, forming large masses, often 2 m long. Leaves 4 to 8 in a whorl, thin, narrowly oblong, serrulate, 0.5 to 1.5 cm long. Flowers about 0.5 cm long, the perianth very variable, the male flowers escaping from the sheaths, when mature, and floating on the surface of the water.

Abundant in fresh-water esteros, and in the Mariquina River; widely distributed in the Philippines. Europe through Asia to the Mascarene Islands, Malaya, and Australia.

2. VALLISNERIA Linnaeus

Submerged, tufted, stemless, stoloniferous, herbaceous, the leaves very long, thin, linear. Male flowers very numerous, minute, in an ovoid, 3-lobed, shortly peduncled spathe; sepals 3; petals none; stamens 1 to 3. Female flowers solitary, in a tubular, 3-toothed spathe, terminating a very long, filiform, spiral scape; perianth as in the male flowers. Fruit linear, included in the spathe, many-seeded. (In honor of A. Vallisneri, an early Italian botanist.)

A genus with three or four species in all warm regions.

1. **V. gigantea** Graebn. Sintas (Tag.) (From Sp. *cinta*=ribbon); Eel Grass.

Leaves often 2 m or more in length, or sometimes only a few cm, according to the depth of the water, thin, 1 cm wide or less. Staminate spathes about 0.5 cm long: when the flowers emerge they break off, rise to and float on the surface of the water. Female spathes floating on the surface of the water at the time the flowers are open, but after fertilization the scape coils up and draws the ovary down to ripen under water.

Abundant in the Mariquina River at Pasig; in shallow water in lakes and still streams throughout the Philippines. New Guinea.

3. OTTELIA Persoon

Submerged herbs in fresh water. Leaves crowded, the submerged ones often narrow, the floating ones long-petioled, with broad blades. Flowers solitary, sessile, on a tubular, 2-fid spathe. Sepals linear or oblong. Petals large, obovate or orbicular, the base with fleshy appendages. Stamens 6 to 15. Ovary oblong, beaked, almost 6-celled; styles 6, linear, 2-fid; ovules many. Fruit oblong, 6-valved, enclosed in the spathe.

Species 6 or 7, tropical and subtropical, 1 in the Philippines.

1. **O. alismoides** (L.) Pers. Calaboa (Tag.).

Roots fibrous. Leaves extremely variable, short- or long-petioled according to the depth of the water, the blades of the submerged leaves often narrow, of the floating ones ovate to suborbicular, 5 to 20 cm long and wide, base rounded or often cordate. Flowers white, about 2 cm long. Fruit oblong, crowned by the withered perianth, 2.5 to 4 cm long, the enclosing perianth-tube winged.

Abundant in the Mariquina River near Pasig, and in various fresh-water esteros; throughout the Philippines in shallow lakes and in still streams. Tropical Asia to Australia.

4. HALOPHILA Thouars

Slender, submerged, monoecious or dioecious, marine plants. Leaves in pairs at each node of the slender creeping stem, ovate to oblong. Spathes of both sexes small, solitary, sessile between the pairs of leaves, 1-flowered. Male flowers pedicelled. Sepals 3. Petals none. Anthers 3, subsessile. Female flowers sessile. Sepals 3. Ovary 1-celled. Styles 3, filiform. Ovules several or many. Fruit subglobose, beaked. (Greek "salt" and "to love" from habit of growth in salt water.)

Species, 6 or more, tropical seas of both hemispheres, at least 3 in the Philippines.

Leaves ovate-elliptic, 4 to 5 mm wide.. 1. *H. ovata*
Leaves linear-oblong to lanceolate, about 2 mm wide................ 2. *H. beccarii*

1. **H. ovata** Gaudich.

A very slender, prostrate, creeping, submerged, marine plant, the stems branched, rooting at the nodes. Leaves ovate-elliptic, thin, obtuse, about 10 mm long, 4 to 5 mm wide, the petioles slender. Flowers small, solitary, monoecious or dioecious, the staminate ones pedicelled, the stamens 3, the pistillate ones sessile, the perianth small, 3-parted. Ovary ovoid, 2 mm long; styles 3, slender, about 6 mm long. Mature fruit membranaceous, globose, 2 to 2.5 mm in diameter.

In shallow water, Manila Bay, abundant February to May, and washed up on the beach in considerable quantities. Otherwise known only from the Marianne Islands.

2. **H. beccarii** Aschers.

A delicate, densely matted or caespitose submerged plant, the slender stems creeping and rooting on muddy bottoms. Leaves very thin, lanceolate to linear-oblong, 0.8 to 1.5 cm long, about 2 mm wide, on long slender petioles. Flowers small, monoecious.

Abundant in some fish ponds in salt water, entirely submerged, near Parañaque, in places quite covering the bottom; Ceylon and Borneo.

5. THALASSIA Solander

Submerged herbs growing in salt water, the rootstock slender, creeping, marked with annulate rings. Leaves in pairs or fascicles at the nodes of the rootstock, flat, linear, thin or coriaceous, arising from the axil of a membranaceous sheath. Flowers monoecious, solitary, in a 2-valved spathe. Male flowers with 3 petaloid sepals, the petals none. Stamens 6. Rudimentary ovary none. Spathe with its valves connate at the top. Female flowers: Ovary 1-celled; ovules many. Spathe caducous. Fruit stipitate, globose, smooth, rugose, or echinate, coriaceous, 6-valved, the valves persistent, spreading. (Greek "of the sea.")

Species 2, tropical shores of both hemispheres, 1 in the Philippines.

1. **T. hemprichii** (Ehrenb.) Aschers.

Rootstock 2 to 3 mm in diameter, rather closely annulate. The young shoots covered with hyaline sheaths. Leaves green, coriaceous when fresh, membranaceous when dry, 3 to 20 cm long, 8 to 10 mm wide, somewhat falcate, tip rounded, 2 to 5 in each fascicle. Fruit softly echinate.

Shallow water of Manila Bay, occasionally washed up on the beach at Pasay. Of local occurrence in the Philippines. Red Sea through the Indian Ocean to Polynesia.

13. GRAMINEAE[1] (GRASS OR ZACATE FAMILY)

Slender or coarse, annual or perennial plants of various habit, or in one tribe, the bamboos, woody and tree-like. Stems jointed, terete or compressed; internodes usually hollow, sometimes solid. Leaves simple, usually long and narrow, entire, parallel-veined, the sheathing portion distinct from the blade, split down one side. Inflorescence various, of few to many spikelets in panicles, racemes, spikes, or heads, the spikelets composed of 2 to many, 2-ranked, imbricated scales (glumes), the lowest ones normally empty, sometimes wanting, one or more of the upper glumes containing a flower enclosed by the bract-like palea. Flowers perfect or staminate, sometimes monoecious or dioecious. Stamens 1 to 6, usually 3. Ovary 1-celled, 1-ovuled. Fruit a seed-like grain (caryopsis).

Genera about 345, species over 4,000, in all parts of the world, about 75 genera and 225 species known from the Philippines.

1. Spikelets 1-, rarely 2-flowered, falling from the pedicel entire or with certain joints of the rachis, the rachilla not produced.
  2. Spikelets cylindric or somewhat dorsally compressed; empty glumes manifest.
    3. Flowering glume and palea hyaline, much more delicate in texture than are the empty glumes.
      4. Spikelets unisexual, on separate inflorescences or on different parts of the same inflorescence. (Tribe MAYDEAE.)
        5. Staminate and pistillate inflorescences on different parts of the same plant .... 1. *Zea*

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[1] For the grasses of the entire Archipelago see Merrill, E. D., "An Enumeration of Philippine Gramineae with Keys to the Genera and species." *Philip. Journ. Sci.* 1 (1906) *Suppl.* 307–391.

5. Staminate and pistillate spikelets in the same inflorescence. 2. *Coix* 75

4. Spikelets usually in pairs, sometimes solitary or in threes, one sessile and one or two pedicellate, in the same inflorescence, the sessile one perfect, the pedicelled usually male or empty. (Tribe ANDROPOGONEAE.)

5. Spikelets all similar, perfect; joints of the rachis not much thickened nor excavated for the reception of the spikelet.

6. Axis of the spikes continuous.

7. Spikelets solitary, in several, slender, unilateral, digitately arranged spikes........................ 3. *Dimeria* 75

7. Spikelets in pairs, the spikes forming a white, cylindric, spike-like panicle........................ 4. *Imperata* 75

6. Axis of the spikes jointed.

7. Spikes solitary, terminal.

8. Spikelets in pairs at each joint of the rachis. 5. *Pogonatherum* 76

8. Spikelets in threes at each joint of the rachis. 6. *Polytrias* 76

7. Spikes 2 to many, digitate or crowded on the short main axis.

8. Spikelets solitary........................ 7. *Arthraxon* 76

8. Spikelets in pairs, one sessile and one pedicelled.

9. Spikelets 1-, rarely 2-flowered, when 2-flowered the first empty glume with a median furrow.. 8. *Pollinia* 77

9. Spikelets 2-flowered, the first empty glume not furrowed........................ 14. *Ischaemum* 80

7. Spikes in a much-branched panicle upon an elongated main axis........................ 9. *Saccharum* 77

5. Spikelets dissimilar, the joints of the spike cylindric, more or less hollowed out for the reception of the spikelets.

6. Spikelets in pairs.

7. First empty glume flat; very coarse grasses.. 10. *Rottboellia* 78

7. First empty glume globose; a slender, much-branched grass........................ 11. *Manisuris* 78

6. Spikelets solitary........................ 12. *Ophiurus* 79

5. Spikelets dissimilar; joints of the spikes not thickened nor excavated.

6. Sessile spikelets 2-flowered.

7. Spikes reduced to a terminal joint, with 3 spikelets, more or less enclosed by a sheathing leaf........................ 13. *Apluda* 79

7. Spikes with many joints, digitate or in pairs; spikelets awned........................ 14. *Ischaemum* 80

6. Sessile spikelets 1-flowered; grasses of various habit with awned or unawned spikelets.

7. Fertile spikelets surrounded by a whorl of sterile or male ones........................ 15. *Themeda* 81

7. Fertile spikelets not surrounded by a whorl of sterile or male ones........................ 16. *Andropogon* 81

3. Flowering glumes similar in texture to the empty ones, never hyaline or thin; inflorescence spicate, solitary, the spikelets falling singly or in groups.

4. Inflorescence spicate. (Tribe ZOISEAE) .... 17. *Zoisia* 84
4. Inflorescence paniculate. (Tribe TRISTIGINEAE) .... 18. *Arundinella* 85
3. Flowering glume and palea very different in texture and appearance from the empty glumes, coriaceous or chartaceous. (Tribe PANICEAE.)
4. Spikelets all perfect.
5. Spikelets not involucrate.
6. Empty glumes 2.
7. Perfect flowers 1 in each spikelet.
8. First empty glume with a ring-like callus.... 19. *Eriochloa* 85
8. Ring-like callus wanting; spikelets in 1-sided racemes or spikes.
9. Spikelets ovate or orbicular, obtuse, rarely acute. 20. *Paspalum* 86
9. Spikelets lanceolate or ovate-lanceolate, acute or acuminate .... 21. *Digitaria* 87
7. Perfect flowers 2 in each spikelet .... 22. *Isachne* 89
6. Empty glumes 3.
7. Glumes unawned; spikelets panicled or spicate. 23. *Panicum* 89
7. Empty glumes or flowering glumes awned or awn-pointed.
8. Slender grasses; empty glumes smooth.... 24. *Oplismenus* 94
8. Coarse grasses; empty glumes muricate. 23. *Panicum* § *Echinochloa*
5. Spikelets subtended by an involucre consisting of 1 to many bristles or spines which are sometimes grown together.
6. Involucre of 2 spine-bearing valves quite enclosing the spikelets .... 25. *Cenchrus* 95
6. Involucre of numerous bristles .... 26. *Setaria* 95
6. Involucre of solitary bristles.
7. A floating aquatic grass .... 27. *Chamaeraphis* 96
7. A terrestrial grass .... 26. *Setaria* 95
4. Spikelets monoecious or dioecious.
5. Monoecious; a slender, prostrate grass, the inflorescence a terminal spike, the 2 lower spikelets perfect, the 4 to 6 upper ones male .... 28. *Thuarea* 96
5. Dioecious; a very coarse, spreading grass; female flowers in large, globose heads with very long slender spines; male flowers in umbellately disposed racemes .... 29. *Spinifex* 97
2. Spikelets laterally compressed; empty glumes none or rudimentary. (Tribe ORYZEAE.)
3. Empty glumes 2, short but distinct; spikelets awned or awnless. 30. *Oryza* 97
3. Empty glumes none; spikelets awnless .... 31. *Leersia* 98
Spikelets 1- to many-flowered, the empty glumes persistent, the rachilla articulated above the empty glumes and produced above the upper glume.
2. Stems herbaceous; leaf-blades sessile, not jointed with the sheaths.
3. Spikelets 1-flowered; inflorescence paniculate. (Tribe AGROSTIDEAE.)
4. Flowering glume awnless .... 32. *Sporobolus* 98
4. Flowering glume with a slender, 3-fid awn .... 33. *Aristida* 99
3. Spikelets few- to many-flowered, if 1-flowered then the spikes digitately arranged.

4. Spikelets on the spike-like branches of a simple panicle. (Tribe FESTUCEAE.)
  5. Flowering glumes 1- to 3-nerved........................ 34. *Diplachne* 99
  5. Flowering glumes several-nerved........................ 35. *Centotheca* 100
4. Spikelets in open compound panicles, the branches usually not spike-like.
  5. A very coarse grass; rachilla clothed with long white hairs. 36. *Phragmites* 100
  5. Slender grasses; rachilla glabrous or merely pubescent; glumes 3-nerved........................ 37. *Eragrostis* 100
4. Spikelets in 2 rows on one side of the digitately or racemosely arranged spikes. (Tribe CHLORIDEAE.)
  5. Spikes digitate or approximate.
    6. Spikelets 1-flowered........................ 38. *Cynodon* 103
    6. Spikelets 2- or more flowered, the upper flowers imperfect, the flowering glume awned........................ 39. *Chloris* 103
    6. Spikelets with from 3 to 6 perfect flowers.
      7. Spike with terminal spikelets........................ 40. *Eleusine* 103
      7. Spikes with the rachis extended beyond the upper spikelets in a manifest point........................ 41. *Dactyloctenium* 104
  5. Spikes racemosely arranged along the elongated rachis, filiform; spikelets very small, alternate, several-flowered. 42. *Leptochloa* 104
2. Stems woody, plants usually tree-like; leaf-blade with a petiole-like base which is jointed with the sheath. (Tribe BAMBUSEAE.)
  3. Spikelets scattered along the branches, usually more than 1-flowered. 43. *Bambusa* 105
  3. Spikelets in dense globose or cylindric clusters along the branches, 1-, rarely 2-flowered........................ 44. *Schizostachyum* 106

1. ZEA Linnaeus

A tall, stout, unbranched, monoecious grass, the stems solid. Leaves large, broad, flat. Male inflorescence of terminal, racemosely arranged spikes, the spikelets in pairs, one sessile, one pedicellate at each of the alternating teeth of the unjointed rachis, the glumes 4, first and second empty, enclosing the very thin third and fourth ones. Female inflorescence a solitary, axillary, stout, sheathed spike, the rachis thick, spongy, the spikelets 1-flowered, sessile, densely crowded in many vertical series on the thick, cylindric rachis. (A Greek name for some undetermined grain.)

A genus of one or two exceedingly variable species, natives of tropical America, represented here by the following introduced and extensively cultivated species.

*1. Z. MAYS L. Mais (Sp.); Corn, Indian Corn, Maize.

A very coarse, erect, grass, usually about 2 m high, the leaves very large, often 10 cm wide and up to 1 m in length. (Fl. Filip. *pl. 279.*)

Commonly cultivated in and about Manila, and throughout the Philippines; introduced by the Spaniards at an early date, originating in tropical America. Cultivated in all temperate and tropical countries.

A closely allied genus and species, *Euchlaena luxurians* Schrad., generally known as "teosinte," has been cultivated in Singalon, but seems no longer to be grown here. It is a native of Mexico and is very similar to *Zea mays* in habit and appearance, differing chiefly in its smaller female inflorescence, the spikelets and grains arranged in a single row.

Pop corn — Zea mays everta

2. COIX Linnaeus

Tall, coarse, erect, branched, annual or perennial grasses with long, broad leaves. Spikes numerous, axillary and terminal, the lower spikelets solitary, female, enclosed in a hardened, shining, bead-like capsule, the pedicels bearing the male spikelets protruding through the apex of the capsule. Male spikelets lanceolate, in pairs or in threes at each node of the rachis, 1 sessile, and 1 or 2 pedicelled. Glumes 4, the first and second subequal, empty, the third and fourth thin, paleate, each enclosing a flower, or empty. Female spikelets ovoid, acuminate, of 4 glumes, the first chartaceous, the others thinner. Grain orbicular, enclosed in the hardened, shining capsule. (A Greek name used by Theophrastus for some reed-like plant.)

Species 3 or 4, or reduced by some botanists to a single variable one, in the tropics of the Old World, 2 forms in the Philippines.

1. C. LACHRYMA-JOBI L. Tigbe (Tag.); Job's Tears.

Stems coarse, stout, 1 to 2 m high, branched. Leaves 10 to 40 cm long, 2.5 to 4 cm wide, acuminate, base broad, cordate. Spikes 6 to 10 cm long, erect, peduncled. Male spikelets about 8 mm long. Capsule enclosing the female flowers and the grains hard, bony, white or nearly black, shining, ovoid, about 8 mm long. (Fl. Filip. *pl. 188.*)

In waste places, occasional, fl. Oct.–Feb., and probably in other months; widely distributed in the Philippines. Tropical Asia and Malaya, cultivated in tropical Africa and America. Probably a native of India, and of prehistoric introduction in the Philippines.

3. DIMERIA R. Brown

Slender, annual or perennial grasses. Leaves narrow, flat. Spikelets 1-flowered, unilateral, sessile or pedicelled, on 1 or 2 to several, digitately or racemosely arranged spikes, the rachis not jointed. Glumes 4, the first linear, rigid, the second broader, compressed, the third smaller, hyaline, empty, the fourth hyaline, entire or 2-lobed, keeled, 1-nerved, usually awned, containing a perfect flower. Grain linear, laterally compressed, free.

Species about 12, Asia to Australia, 1 in the Philippines.

1. **D. ornithopoda** Trin., var. **tenera** (Trin.) Hack.

A very slender, annual, erect, more or less tufted grass 10 to 40 cm high. Leaves linear, 2 to 3 cm long. Inflorescence long-exserted, consisting of 2, ascending or spreading, slender spikes 5 cm long or less, digitately arranged at the apex of the stem, the rachis slender, slightly flexuous. Spikelets sessile, about 2 mm long, the awn of the fourth glume very slender, often nearly 1 cm long. (Greek "two parted" in allusion to the two spikes.)

In open wet lands, especially in fallow rice paddies, etc., fl. Aug.–Dec.; widely distributed in the Philippines. India to Australia.

4. IMPERATA Cyrilli

Perennial, erect, unbranched grasses from stout underground rootstocks. Leaves flat. Spikelets 1- or 2-flowered, in dense, spike-like, silvery-silky panicles, in pairs, both pedicelled, the upper flower perfect, the lower imperfect or none. Glumes 4, thin, awnless, the first and second lanceolate, hairy, the third and fourth much smaller, thin, glabrous. Stamens 1 or 2; anthers large. Grain small, oblong, free. (In honor of F. Imperato, an early Italian pharmacist.)

Species 5, chiefly tropical, 2 in the Philippines.

1. **I. cylindrica** (L.) Beauv., var. **koenigii** (Retz.) Benth. Cogon (Tag.).

An erect grass 30 to 80 cm high, the stems solid, rather slender, the nodes glabrous or bearded. Leaves flat, linear-lanceolate, acuminate, erect, 20 to 50 cm long, 5 to 9 mm wide. Panicles exserted, dense, subcylindric, spike-like, white, 10 to 20 cm long, 5 to 15 cm in diameter, silvery-silky. Callus hairs copious, about twice as long as the glumes. Spikelets 3 to 4 mm long.

In open, rather dry lands, common, fl. at intervals throughout the year; widely distributed in the Philippines. All warm countries.

5. POGONATHERUM Beauvois

Slender, tufted, erect, annual or perennial grasses with capillary peduncles and small, erect leaves. Inflorescence spicate, solitary. Spikelets 1- or 2-flowered, in pairs, usually a sessile perfect one, and a pedicelled female one, densely crowded on the slender, fragile rachis of the slender spike, the slender awns often interlaced. Glumes 4, thin, the first oblong, truncate or rounded, long-ciliate, the second as long as the first, acute or 2-toothed, awned, the fourth narrow, 2-fid, long-awned. Grain oblong, free. (Greek "beard" and "awn" in allusion to the inflorescence.)

A genus of 2 or 3 closely allied species, India to Japan southward to Malaya, 1 in the Philippines.

1. **P. paniceum** (Lam.) Hack. (*P. saccharoideum* Beauv.).

A slender, densely tufted, branched, erect grass 15 to 40 cm high. Leaves 3 to 8 cm long, 3 mm wide or less. Spikes brownish, slender, 2 to 4 cm long, the awns very slender, 1.5 to 2 cm long.

On ledges and banks along streams, and in ravines, Masambong, Guadalupe, etc., fl. at intervals throughout the year; common and widely distributed in the Philippines. India to China and Japan, southward to Malaya.

6. POLYTRIAS Hackel

A low, slender, prostrate grass with ascending flowering branches, the spikes terminal, brown, hairy, solitary, the rachis jointed, each joint bearing two sessile spikelets and a pedicellate one, all 1-flowered. First and second glumes equal, hairy, pointed, the third lacking, the fourth hyaline, long-awned. Palea minute, subobsolete. (Greek "many" and "three," in allusion to the joints of the rachis each bearing three spikelets.)

A monotypic genus, native of Java, also found in Singapore (introduced?), and introduced in the West Indies.

P. praemorsa (Nees) Hack. 1850

1. [P. DIVERSIFLORA (Steud.) Nash. (*P. praemorsa* Hack.).]

A slender annual grass, the stems usually decumbent, branched below, the flowering branches erect or ascending, 20 to 40 cm long. Leaves linear-lanceolate, 2.5 to 6 cm long, 2 to 4 mm wide. Spikes solitary, erect, brown, hairy, 4 to 7 cm long. Spikelets hairy, about 4 mm long, the awns about 1 cm long.

In open grass lands and waste places, fl. Oct.–Feb.; not common in the Philippines outside of the immediate vicinity of Manila. Introduced from Singapore or Java. Java, Singapore, and the West Indies (introduced).

7. ARTHRAXON Beauvois

Slender, annual or perennial, usually branched grasses, with rather short, lanceolate to broadly lanceolate, often cordate leaves. Inflorescence of from 2 to many, slender, more or less fragile, jointed, digitately arranged spikes. Spikelets solitary, sessile, not in pairs, 1-flowered. Glumes 4, the first the largest, the second keeled, 3-nerved, the third small, hyaline, the fourth smallest, hyaline, long-awned. Stamens 2 or 3. (Greek "jointed" and "stem".)

Species about 12 in the tropics of the Old World, 3 in the Philippines.

1. **A. quartinianus** (A. Rich.) Merr.

A weak, slender, ascending or rambling, somewhat branched grass reaching a length of 1 m or less. Leaves lanceolate, 2 to 5 cm long. Inflorescence exserted, of 2 or 3, rarely more, slender, 2 to 5 cm long, green or purplish spikes, the joints of the rachis white-pilose. Spikelets lanceolate, acuminate, 5 to 6 mm long, rather distant, scabrid, the awn slender, geniculate, longer than the spikelet.

In dry thickets and open places, San Pedro Macati, fl. Dec.–Jan.; otherwise known in the Philippines only from northern Luzon. India to Abyssinia.

8. POLLINIA Trinius

Annual or perennial erect grasses, the spikes subdigitately fascicled at the ends of the stems, hairy, the rachis fragile. Spikelets in pairs, one sessile, one pedicelled, 1-flowered, or the sessile one 2-flowered. Glumes 4, the first flattened or concave, margins narrowly inflexed, the second as long as the first, keeled, acute, the third hyaline, ciliate, the fourth very short, hyaline, or reduced to the dilated base of the long, twisted, exserted awn. (In honor of C. Pollini, an Italian botanist.)

Species about 30, tropical and subtropical parts of the Old World, 10 in the Philippines, 1 in our area.

1. **P. argentea** Trin.

A tufted, erect, unbranched, rather slender grass 20 to 60 cm high. Leaves linear, 5 to 15 cm long, mostly basal. Spikes 2 to 5, silky-hairy, 3 to 9 cm long, at the apex of the stem, somewhat flexuous. Spikelets about 3 mm long, silky-hairy with white hairs, the awns 6 mm long or longer.

In dry grass lands, apparently rare in our area, June; widely distributed in the Philippines. India, Malaya, and northern Australia.

9. SACCHARUM Linnaeus

Tall, coarse, erect, perennial, usually unbranched grasses, the stems solid. Inflorescence a large terminal panicle, the branches slender, jointed. Spikelets small, awnless, 1-flowered, in pairs, 1 sessile with a perfect flower, 1 pedicelled with a female flower. Glumes 4, all thin, the third empty, the fourth shorter than the others, rarely wanting. (Latin "sugar.")

Species about 12, chiefly in the tropics of the Old World, 3 in the Philippines.

Stem silky below the panicle; leaves harsh, 1.5 cm wide or less. 1. *S. spontaneum*

Stem glabrous below the panicle; leaves broad, up to 5 cm in width; cultivated only........ 2. *S. officinarum*

1. **S. spontaneum** L. subsp. **indicum** Hack. Talahib (Tag.).

A coarse, erect perennial, usually more or less tufted or gregarious grass 1 to 3.5 m high, from stout underground rootstocks. Leaves harsh, linear, slenderly acuminate, 0.5 to 1 m long, 6 to 15 mm wide. Panicle white, erect, 15 to 30 cm long, the branches slender, spreading, whorled, fragile, the joints clothed with long, soft, white hairs. Spikelets about 3.5 mm long, very much shorter than the copious long white hairs at the base.

In open waste places, fallow lands, etc., fl. Sept.–Nov., and Apr.–June; very common and widely distributed in the Philippines. Southern Europe through the tropics of the Old World to Australia.

* 2. S. OFFICINARUM L. Tuba (Tag.); Caña dulce (Sp.); Sugar Cane.

A coarse, erect grass 1.5 to 3.4 m high, the stems green, yellow, or purplish, 2 to 5 cm thick, the internodes long or short. Leaves very large, broad. Panicles very large, 40 to 80 cm long, white, the branches up to 35 cm in length, the stems glabrous below the panicle. Spikelets very numerous, about 3 mm long, the surrounding white, villous hairs about twice as long as the spikelet. (Fl. Filip. *pl. 18.*)

Cultivated to a small extent in the vicinity of Manila, occasionally flowering; extensively cultivated in the Philippines. Probably a native of tropical Asia, now cultivated in all tropical countries; of prehistoric introduction in the Philippines.

10. ROTTBOELLIA Linnaeus filius

Coarse, erect, annual or prennial grasses, the leaves mostly broad. Spikes few or many, cylindric, solitary or panicled, the rachis fragile, the joints usually excavated at the tip. Spikelets in pairs, 1 sessile and 1 pedicelled, the former perfect, the latter imperfect, its pedicel often adnate to the joint, the spikelets more or less immersed in the hollowed outside of the rachis-joints. Sessile spikelets with 4 glumes, the first coriaceous, covering the excavation in the rachis-joint, the second thinner, keeled, the third and fourth hyaline, not awned. (In honor of C. F. Rottboell, a Danish botanist.)

Species about 30, in the tropics of both hemispheres, 3 in the Philippines, a single one in our area.

1. R. exaltata L. f. Aguingay (Tag.).

A coarse, erect, usually branched, annual grass 1 to 2.5 m high, the stems stout, spongy inside, the sheaths armed with few or many, stiff, irritating hairs. Leaves flat, 20 to 60 cm long, 1 to 3 cm wide, acuminate. Spikes cylindric, 8 to 15 cm long, about 3 mm in diameter, mostly solitary, narrowed upward, readily breaking up, the joints 6 to 7 mm long. Spikelets immersed in the side of the rachis, the first glume of the second one about 4 mm long, very coriaceous.

In open, well-drained grass lands, thickets, etc., fl. all the year; throughout the Philippines. Tropical Africa and Asia through Malaya to Australia.

11. MANISURIS Swartz

A slender, much-branched, annual grass, more or less hairy, the leaves cordate at the base. Spikes cylindric, slender, solitary, axillary and terminal, numerous, the peduncles often confluent and forming a leafy panicle, the rachis fragile, joints very short, deeply excavated. Spikelets 1- or 2-flowered, in pairs, one sessile, globose, pitted externally, the other pedicelled, ovate, flat, male or neuter, its pedicel adnate to the rachis-joint. Sessile spikelet with 4 glumes, the first globose, pitted, awnless. (Said to be from the Greek "lizard" and "tail," in allusion to the form of the spike.)

A monotypic genus.

1. M. GRANULARIS L. f.

A slender, more or less hairy grass 20 to 60 cm high, erect, at length much-branched. Leaves 15 cm long or less, 3 to 12 mm wide, papillose-hirsute, margins ciliate. Spikes 1 to 2 cm long, slender. Sessile spikelet about 1 mm in diameter, the pedicellate one about 2 mm long.

In dry grass lands, near Fort McKinley, fl. Sept.–Dec.; widely distributed in the Philippines, certainly introduced. Tropics generally.

12. OPHIURUS Gaertner

Annual or perennial, erect, fine or coarse grasses, the spikes solitary or fascicled, fragile, cylindric. Spikelets 1-flowered, solitary, sessile in the joints of the rachis, the lateral ones absent or very rudimentary. Glumes 4, the first thickly coriaceous, the second thin, the third and fourth hyaline. (Greek "snake" and "tail" in allusion to the shape of the spike.)

Species 2, Africa, Asia, and Malaya, both in the Philippines, 1 in our area.

1. O. monostachyus Presl.

A slender, somewhat wiry, erect or ascending, loosely tufted, glabrous grass 20 to 40 cm high. Leaves linear, 15 cm long or less, about 2 mm wide. Spikes solitary, slender, cylindric, 5 to 10 cm long, 2 mm in diameter, the spikelets immersed in the joints of the rachis, about 4 mm long.

Banks of old rice paddies and in open grass lands, Caloocan, San Juan del Monte, etc., fl. Sept.–March; not common in the Philippines. Marianne Islands, Formosa, Hongkong, and Tonkin.

13. APLUDA Linneaus

Tall, leafy, erect or scandent grasses, the stems usually more or less decumbent and rooting at the lower nodes, branched. Leaves flat, numerous. Inflorescence of many, small, simple spikes, each subtended by a special thin spathe, together forming a leafy panicle. Spikes of one linear joint, swollen at the base, jointed on the top of the peduncle at the base of the spathe. Spikelets 3, one sessile, 2-flowered, flowers perfect, one pedicelled, imperfect, reduced to a small glume, and one terminal, male or neuter, rarely bisexual. Glumes 4, the fourth awned or not, entire or 2-toothed. Grain oblong. (Said to be from the resemblance of the glumes to chaff.)

A genus of one or two variable species, India to Malaya and Polynesia, one in the Philippines.

1. A. mutica L. Cauacauayan (Tag.).

A tall, erect or subscandent, somewhat slender and glaucous grass, glabrous or nearly so, 1 to 2 m high, the stems round, smooth, branched, solid. Leaves acuminate, 10 to 30 cm long, 5 to 10 wide, base narrowed, usually somewhat petioled, the upper ones gradually shorter. Spathes subtending the spikelets lanceolate to linear-lanceolate, variable in length, longer or shorter than the peduncles, the spikes about 8 mm long, green or purplish, the spikelets awnless.

In thickets, fl. Sept.–Feb.; widely distributed in the Philippines. India to China, Malaya, and Polynesia.

Var. **aristata** (L.) Rendle.

Differing from the species in having the fourth glume of the perfect spikelet long-awned, the awn usually about 1 cm in length.

India to China; rare in the Philippines.

14. ISCHAEMUM Linnaeus

Annual or perennial, erect or ascending grasses. Spikelets in pairs, one sessile and one pedicelled, in digitate, paired, or fascicled, more or less fragile spikes at the ends of the stems. Sessile spikelets with 4 glumes, the first oblong, usually thick, awnless, the second as long as the first but narrower, the third hyaline, thin, the fourth hyaline, cleft, awned. Pedicelled spikelets similar to the sessile ones, often imperfect. (Greek "stypic", in allusion to the use of some species to stop the flow of blood.)

Species about 40, chiefly tropical, about 7 in the Philippines.

1. Spikes 2, closely appressed to each other; first glume of the sessile spikelets rugose.
   2. Perennial; first glume nearly flat, with 2 to 4 marginal nodules or low transverse wrinkles .... 1. *I. aristatum*
   2. Annual; first glume strongly convex, closely transversely ridged. 2. *I. rugosum*
1. Spikes 4 to 7; first glume of the sessile spikelet not rugose. 3. *I. intermedium*

1. **I. aristatum** L., var. **gibbum** (Trin.) Hack.

An erect, little or not at all branched, loosely tufted or scattered grass 40 to 80 cm high. Leaves flat, 6 to 15 cm long, about 5 mm wide. Spikes 2, closely appressed, erect, appearing like a single cylindric spike, 4 to 7 cm long, the internodes shorter than the spikelets. Sessile spikelets about 7 mm long, the first glume slightly wrinkled, the awn of the fourth glume about 1.5 cm long.

In open grass lands, fl. all the year; common and widely distributed in the Philippines. The species in India, China, and Malaya, the variety endemic.

2. **I. rugosum** Salisb., var. **distachyum** (Cav.) Merr.

A rather slender, erect or ascending, annual grass, the stems ultimately much branched, sometimes prostrate below, 30 to 70 cm long, glabrous or sparingly hairy. Leaves 8 to 15 cm long, 5 to 8 mm wide, flat, acuminate. Spikes 2 at the end of each stem, appressed, 4 to 6 cm long. First glume of the sessile spikelet oblong, convex, 5 mm long, prominently transversely wrinkled, the awn of the fourth glume slender, about 2 cm long. Pedicelled spikelets about 4 mm long.

In open grass lands, Caloocan, San Juan del Monte, etc., fl. Nov.–Jan.; widely distributed in the Philippines. India to China and Malaya.

3. **I. intermedium** Brongn.

A widely spreading, somewhat branched grass, the ascending stems 1 m long or more. Sheaths rather loose, usually pilose. Leaves flat, up to 15 cm in length and 1.5 cm wide. Spikes 5 to 7, digitately crowded at the ends of the stems, 4 to 7 cm long, green. Spikelets lanceolate, about 6 mm long, acuminate, the glumes not wrinkled. Awn to the fourth glume about 1 cm long.

In thickets bordering low wet lands, fl. Sept.–Dec.; widely distributed in the Philippines. Marianne Islands.

15. THEMEDA Forskal

Tall, annual or perennial grasses, with usually long leaves. Spikes many, short, crowded in panicled fascicles, the fascicles and spikes with spathe-like leafy sheaths. Spikelets many, the lower ones male or neuter awnless, forming a false whorl about the 1 to 3 middle perfect ones which are long-awned. Perfect or female spikelets linear-oblong, the first glume terete or dorsally compressed or channelled, coriaceous, the second as long, the third hyaline, 1-nerved, the fourth very narrow, awned. Pedicelled spikelets with 1 to 3, 1- to many-nerved glumes with often inflexed margins and keeled wings. (From its Arabian name *thaemed.*)

Species about 10, warm parts of the Old World, 2 or 3 in the Philippines.

1. **T. triandra** Forsk.

Erect, perennial, nearly glabrous, 0.5 to 1.5 m high, the stems rather slender, often with short branches and very leafy above. Leaves linear, 8 to 20 cm long, glabrous or slightly hairy. Inflorescence long or short-peduncled, paniculate, the spathes longer than the spikes, the outer ones up to 5 cm in length. Lower whorled spikelets about 1 cm long, the perfect one solitary, somewhat shorter.

In open dry grass lands near La Loma, Fort McKinley, etc., fl. May–Oct.; widely distributed in the Philippines. Tropical Africa and Asia through Malaya to Australia.

16. ANDROPOGON Linneaus

Fine or coarse grasses of various habit. Leaves flat, base rounded or cordate. Spikes solitary, in pairs, digitate, or panicled, the rachis usually fragile, jointed. Spikelets usually narrow, in pairs, one sessile, female or bisexual, the other pedicelled, male or neuter. Sessile spikelets 1-flowered, the glumes 4, the first usually keeled, dorsally, rarely laterally compressed, the second as long as the first, awned or not, the third hyaline, empty, the fourth hyaline, broad or narrow, 2-fid and awned in the cleft or reduced to an awn. Pedicelled spikelets various, glumes 3 or 4, the fourth awnless. (Greek "man" and "beard" in allusion to the bearded inflorescence of some species.)

Species about 240, tropical, subtropical, and temperate, about 18 in the Philippines. A very large and polymorphous genus of many sections or subgenera, these by some botanists considered to be of generic rank.

1. Internodes of the spike deeply cupped at the apex.
    2. Sessile spikelets of the lowest pairs differing from those above them, in sex or in form; spikes panicled; a cultivated, coarse, tufted, perennial grass, the leaves with a lemon-like odor when crushed. 1. *A. citratus*
    2. Sessile spikelets all alike; solitary, their peduncles enclosed in a spathe-like leaf-sheath; a very slender grass.................................... 2. *A. fragilis*
1. Internodes of the spike truncate, not cupped.
    2. Sessile spikelets of the lowest pairs different from the upper ones.
        3. Spikes digitate, densely white-villous.............................. 3. *A. sericeus*
        3. Spikes solitary; spikelets long-awned.............................. 4. *A. contortus*

2. Sessile spikelets all alike.
   3. Rachis-joints and pedicels with a median, translucent, longitudinal line; spikes peduncled, paniculate........................ 5. *A. intermedius*
   3. Rachis-joints and pedicels without median translucent lines.
      4. Spikes with only 3 spikelets, the tips of the branches bearded; a slender grass.. 6. *A. aciculatus*
      4. Spikes with many spikelets, the tips of the branches not bearded; coarse grasses.
         5. First glume muricate; internodes of the rachis laterally compressed.. 7. *A. zizanioides*
         5. First glume not muricate; internodes of the rachis terete or subterete.
            6. Leaves about 1 cm wide or less.
               7. Flowering-glume long-awned............................ 8. *A. serratus*
               7. Flowering-glume awnless...................................... 9. *A. nitidus*
            6. Leaves mostly 2 to 5 cm wide.
               7. Rachis tenacious; spikelets awned or awnless; panicles dense; an annual grass, cultivated only.... 10. *A. sorghum*
               7. Rachis fragile; panicles lax; spikelets awnless; perennial. 11. *A. halepensis*

1. A. CITRATUS DC. (§ *Cymbopogon.*) Tanglad (Tag.); Paja de meca (Sp.); Lemon Grass.

A tufted perennial grass, the leaves up to 1 m in length, 1 to 1.4 cm wide, when crushed with a strong lemon-like odor, scabrous, flat, long-acuminate, glabrous. Panicles 30 to 80 cm long, interrupted below, the branches and branchlets somewhat nodding. Perfect spikelets linear-lanceolate, pointed, not awned, about 6 mm long.

Frequently cultivated for its fragrant leaves which are used for flavoring food, the source of "Lemon grass oil" of commerce; widely but not extensively cultivated in the Philippines, but not spontaneous, very rarely flowering. Certainly not a native of the Archipelago, but probably of prehistoric introduction. Origin uncertain, but probably India or Malaya, now cultivated in most tropical countries.

2. **A. fragilis** R. Br. (§ *Schizachyrium.*)

A slender annual, the erect or ascending, simple or slightly branched stems 15 to 40 cm high, glabrous, leafy throughout, usually more or less decumbent at the base. Leaves linear or linear-oblong, blunt or acute, 3 to 7 cm long, 2 to 4 mm wide. Spikes solitary, fragile, the peduncle enclosed in a narrow, spathe-like leaf-sheath. Spikelets 4 to 5 mm long, the slender awn of the sessile spikelet somewhat geniculate, about 1.5 cm in length.

In thin, poor soil, open, dry grass lands, San Pedro Macati, etc., fl. Nov.–Feb.; of local occurrence in the Philippines. Queensland and New South Wales.

3. **A. sericeus** R. Br. (§ *Dichanthium.*)

A slender, erect, annual grass, 0.4 to 1 m high, the nodes bearded, the leaves linear-lanceolate, 5 to 12 cm long, 2 to 4 mm wide. Spikes 2 to 4, sessile, digitately arranged at the ends of the stems, 3 to 6 cm long, densely villous with long white hairs. Spikelets crowded, 4 to 5 mm long, the awns geniculate, 2 to 2.5 cm long.

In open, dry grass lands in poor soil, San Pedro Macati, etc., fl. July–Jan.; of local occurrence in the Philippines. New Guinea, New Caledonia, and Australia.

4. A. CONTORTUS L. (§ *Heteropogon.*)

A tufted or somewhat scattered grass 1 m high or less, the stems compressed below, simple or somewhat branched, the spikes solitary, terminal. Leaves flat, 10 to 20 cm long, 4 to 7 mm wide. Spikes 10 cm long or less, the spikelets about 8 mm long, densely imbricated, the lower few pairs staminate or neuter, the upper ones perfect, all hirsute, the awn of the fourth glume stout, twisted, geniculate, about 10 cm long.

In open dry lands, Caloocan to San Pedro Macati, fl. most of the year; rather widely distributed in the Philippines, and surely introduced. All warm countries.

5. A. intermedius R. Br., var. haenkei (Presl) Hack. (§ *Amphilophis.*)

An erect, somewhat stout, loosely tufted, perennial grass, usually about 1 m high. Leaves linear, 20 to 40 cm long, 4 to 6 mm wide. Panicles compound, somewhat purplish, 15 to 20 cm long, the branches numerous, ascending or somewhat spreading, each bearing from 2 to 6, slender, pedicelled spikes, the rachis easily breaking up. Spikelets about 3 mm long, the fourth glume of the sessile ones reduced to a slender awn nearly 1.5 cm in length.

In dry open grass lands, San Pedro Macati, fl. July–Nov.; widely distributed in the Philippines. Southern China and Ceylon, the species also in India, Africa, Malaya, and Australia.

Raphis

6. A. ACICULATUS Retz. (§ *Chrysopogon.*) Amores secos (Sp.–Fil.); Moriscos (Tag.).

Stems densely leafy, creeping and branching below, the flowering stems erect, 20 to 60 cm high. Leaves short, linear-lanceolate, obtuse or acute, 3 to 10 cm long, 4 to 6 cm wide, those on the wire-like flowering stems few. Panicles purplish, open, the branches few, whorled, simple, 5 cm long or less, bearing few-flowered spikes, branches bearded at the tips. Sessile spikelet very narrow, about 3 mm long, the callus elongated, barbed, the fourth glume linear, acuminate, bearing a short, scabrid awn.

In open grass lands, waste places etc., very common, fl. May–Dec.; throughout the Philippines, certainly introduced. India to Polynesia. Very troublesome on account of its spikelets adhering to clothing etc., by their sharp, barbed stalks.

7. A. ZIZANIOIDES (L.) Urb. (*A. squarrosus* L. f.). (§ *Vetiveria.*) Moras, or Raiz de mora (Sp.-Fil.); Vetiver.

A tall, coarse, erect, tufted, perennial grass 1 to 2 m high, with fragrant, fibrous roots. Leaves distichously arranged, numerous, usually about 1 m long, 1 cm wide or less, folded. Panicles terminal, erect, purple or greenish, about 20 cm long, the branches slender, whorled, spreading or ascending, 5 to 12 cm long. Sessile spikelet about 4 mm long, muricate, the awn of the fourth glume very short or none.

Common in open rather wet lands, banks of rice paddies, etc., mostly planted, fl. Aug.–Dec.; widely distributed in the Philippines, but certainly introduced. A native of India, now widely distributed in the tropics, cultivated and wild.

8. **A. serratus** Thunb. (§ Sorghum.)

A somewhat slender or rather stout erect grass 0.8 to 1.5 m high, the stems usually unbranched, nodes pubescent. Leaves 20 to 40 cm long, 10 mm wide or less, acuminate. Panicles rather lax, erect, brownish-red, 10 to 15 cm long, the branches slender, whorled, the lower ones 9 cm long or less. Spikes solitary, scattered on the branches, each with from 2 to 6 joints, the joints, pedicels, and callus short-villous. Sessile spikelets about 5 mm long, oblong-ovoid or ovoid-lanceolate, the first glume somewhat villous, dark-brown or nearly black, shining, the fourth glume small, with a slender geniculate and twisted awn 2 to 2.5 cm long, the pedicelled spikelets very much narrower than the sessile ones.

In open places near streams, Masambong, fl. Dec.–Feb.; widely distributed in the Philippines. Tropical Asia through Malaya to Australia.

9. **A. nitidus** (Vahl) Kunth.

A slender, simple, erect grass 0.6 to 1.2 m high, the nodes prominently bearded. Leaves linear-lanceolate, up to 25 cm long, about 5 mm wide. Panicles long-peduncled, 10 to 20 cm long, lax, the branches slender, whorled, the lower ones, up to 8 cm long, the upper one gradually shorter. Spikelets brown, shining, about 4 mm long, ovoid to oblong-ovoid, brown-hirsute. Flowering glume awnless.

In open grass lands near Santa Mesa, fl. May–July; widely distributed in the Philippines. India to Formosa and Malaya. Very similar to the preceding, differing chiefly in its awnless flowering glumes.

*10. A. SORGHUM (L.) Brot. Batad (Tag.); Sorghum.

A stout, erect, annual grass usually about 2 m high, the stem often 1 cm or more in diameter, solid. Leaves 20 to 50 cm long, 2 to 5 cm wide, acuminate. Panicles dense, 15 to 30 cm long, compound, erect. Spikelets ovoid, more or less pubescent, about 5 mm long, pale, purplish, or nearly black, the first glume hard and shining, the fourth awnless or sometimes awned.

Cultivated sparingly in our area; widely distributed in the Philippines in cultivation, several forms being found in the Archipelago, not spontaneous and certainly not a native of the Archipelago, although of prehistoric introduction. Probably a native of Africa or Asia, now cultivated in all warm and tropical countries.

11. **A. halepensis** (L.) Brot., var. **propinquus** (Kunth) Merr. Batad-batadan (Tag.).

A tall, coarse, erect, unbranched perennial grass 1.5 to 3 m high. Leaves up to 1 m in length, 1.5 to 4.5 cm wide, long-acuminate. Panicles erect, lax, 20 to 40 cm long, the branches few, distant, spreading or drooping. Spikelets numerous, oblong-ovoid, pubescent, greenish or purplish, awness, about 4 mm long. (Fl. Filip. *pl. 436, Sorghum saccharatum.*)

In thickets and open damp places, occasional in our area, fl. most of the year; widely distributed in the Philippines. Ceylon to the Moluccas, the species in most tropical and some temperate regions.

17. **ZOISIA** Willdenow

A low, much-branched, rigid, erect, gregarious grass. Leaves subulate, sharply pointed. Spikelets small, ovoid, 1-flowered, somewhat crowded in erect, narrow spikes, jointed on and appressed to a stiff, notched, unjointed rachis, sessile or shortly pedicelled. Glumes 2, the first empty, laterally compressed, shining, the second smaller, membranaceous, linear-oblong, obtuse. Palea hyaline, short, or none. Grain free within the glumes. (In honor of C. de Zoys.)

A monotypic genus.

1. **Z. matrella** (L.) Merr. (*Z. pungens* Willd.).

A low, gregarious grass from rigid, wiry rootstocks, the branches rooting, sending up short, rather stiff, leafy, flowering branches 10 to 40 cm high. Leaves mostly spreading, 2 to 7 cm long, 2 to 4 mm wide. Spikes slender, solitary, purplish or green, 2 to 4 cm long. Spikelets about 3 mm long.

In open grass lands especially near the sea, fl. all the year; throughout the Philippines near the sea. India to Mauritius, China, Malaya, Polynesia, and Australia.

18. ARUNDINELLA Raddi

Erect, usually unbranched, annual or perennial, slender or rather coarse grasses with flat leaves. Panicles ample, lax or contracted, the spikelets not jointed on the pedicels, usually 1-flowered. Glumes 4, thin, the first ovate, acute or acuminate, much or little shorter than the second which is slenderly awned, the third about as long as the first and with a palea or a male flower, or neuter, the fourth much the smallest, with a perfect flower, awnless or with a slender terminal awn. (Diminutive of Latin "arundo," a reed.)

Species about 30, in most tropical countries, about 5 in the Philippines.

1. **A. agrostoides** Trin.

An erect, tufted, glabrous grass 15 to 45 cm high. Leaves lanceolate, acuminate, numerous, 8 to 20 cm long, 6 to 10 mm wide. Panicles exserted, ovoid or oblong-ovoid, when young open, soon becoming contracted, green, 10 to 20 cm long, the branches whorled, slender, mostly about 5 cm long. Spikelets pedicelled, glabrous, green, lanceolate, acuminate, the first glume lanceolate, acuminate, 3-nerved, 2.5 mm long, the second similar but 3 mm long, 5-nerved, and more slenderly acuminate, the third about 2 mm long, 3-nerved the fourth glume about 1 mm long, hyaline, with a slender straight awn 4 to 5 mm in length.

On ledges along streams, Masambong, opposite Guadalupe, etc., fl. Dec.–Feb.; occasional in northern Luzon. India.

19. ERIOCHLOA Kunth.

Annual or perennial, erect, tufted grasses. Leaves flat. Spikelets secund on the spike-like branches of a raceme or panicle, base thickened and articulate on the thickened top of the short pedicel. Glumes 3, first and second sub-equal, thin, empty, the third shorter, apiculate, hardened in fruit. Grain oblong, free within the hardened glume. Very close to *Paspalum*, but distinguished by its habit and by the thickened base of the spikelet. (Greek "wool" and "grass" in allusion to the hairy inflorescence.)

Species few, tropical and subtemperate, one in the Philippines.

1. **E. ramosa** (Retz.) O. Kuntze (*E. polystachya* HBK.).

An erect, somewhat tufted, rather slender grass 0.5 to 1.3 m high, glabrous except the panicles. Leaves narrowly lanceolate, acuminate, 10 to 20 cm long, 4 to 8 mm wide. Panicles exserted, 8 to 12 cm long, formed of racemosely arranged branches, usually secund, often nodding. Spikelets racemosely arranged, ovoid-lanceolate, acuminate, green or purplish, 3 mm long, in pairs, one of each pair longer pedicelled than the other. First and second glumes appressed-pubescent with grayish hairs.

In open wet grass lands, paddy banks, etc., common, fl. all the year; widely distributed in the Philippines, possibly introduced. Tropics generally.

20. PASPALUM Linnaeus

Annual or perennial, erect, ascending or spreading grasses. Spikelets 1-flowered plano-convex, in spike-like branches of a simple panicle or raceme, the spikes digitately or racemosely arranged. Glumes 3, the first and second equal, thin, the third coriaceous, bearing a perfect flower, the palea similar in texture. (A Greek name for millet.)

Species about 175, in all warm countries, about 4 in the Philippines.

1. Spikes alternate on an elongated rachis.
    2. Spikelets mostly 4-ranked.. 1. *P. longifolium*
    2. Spikelets 2-ranked... 2. *P. scrobiculatum*
1. Spikes in pairs at the ends of the stems.
    2. Spikelets ovate-oblong, glabrous; leaves narrow............ 3. *P. distichum*
    2. Spikelets suborbicular, margins of the second glume ciliate; leaves broad.. 4. *P. conjugatum*

1. **P. longifolium** Roxb.

A tufted, glabrous, erect, perennial grass 0.8 to 1.3 m high, the stems somewhat prostrate and branched below. Sheaths loose. Leaves about 20 cm long, 5 to 8 mm wide. Inflorescence exserted, each composed of from 4 to 8 or more, racemosely arranged, alternate, spreading or ascending, 5 to 8 cm long spikes. Spikelets 2 to 2.5 mm long, somewhat compressed, obovoid, the empty glumes slightly pubescent, densely arranged in about 4 rows on the under surface of the somewhat flattened, green 3 to 4 mm wide rachis.

In open wet grass lands, Pasay, fl. all the year; widely distributed in the Philippines. India to Malaya.

2. **P. scrobiculatum** L.

An erect, rather slender, nearly glabrous, somewhat wiry, tufted, perennial grass 40 to 80 cm high. Leaves flat, 6 to 15 cm long, 5 to 8 mm wide. Spikes 3 or 4, usually spreading, 4 to 8 cm long. Spikelets pale, 2-seriate, about 2 mm long.

In open, usually dry lands, fl. all the year; throughout the Philippines. All warm countries.

Var. **auriculatum** (Presl) Merr.

Much coarser, taller, up to 1 m high. Leaves broad, often auriculate at the base. Spikes stout, 4 to 6. Spikelets 2.5 mm long.

In low damp places near Pateros, fl. Dec.–Jan.; widely distributed in the Philippines, endemic.

Var. **bispicatum** Hack. var. nov.

Smaller than the typical form, 20 to 40 cm high, with usually but two spikes 3 to 4 cm in length.

In old rice lands, San Pedro Macati, fl. July–Sept.; of very local occurrence. Endemic.

3. **P. distichum** L.

Stems creeping and rooting, branched, usually rather stout and somewhat compressed, the flowering branches erect, 15 to 50 cm high. Leaves flat or involute, 4 to 15 cm long, 5 mm wide or less. Spikes 2, terminal, rather stout, 4 to 6 cm long, ascending. Spikelets 2-seriate, about 2.5 mm long.

In low wet grass lands near the sea and tidal streams, fl. Aug.-Nov.; widely distributed in the Philippines near the seashore. All warm countries.

4. **P. CONJUGATUM** Berg.

A gregarious, nearly glabrous grass, the stems spreading and branching below, the flowering branches 20 to 70 cm high. Leaves narrowly lanceolate, flat, thin, 8 to 20 cm long, 5 to 15 mm wide. Spikes, 2, terminal, slender, 6 to 12 cm long, the peduncles slender. Spikelets imbricate, 1.2 to 1.4 mm long, pale-green, plano-convex, the empty glumes with long, soft, white marginal hairs.

In waste places, especially in the shade, very common, flowering all the year; throughout the Philippines, introduced. A native of tropical America, now found in most tropical countries.

In addition to the above species, *Paspalum dilatatum* Poir., an American species, has been cultivated by the Bureau of Agriculture in Singalon.

21. DIGITARIA Scopoli

Annual, mostly ascending or erect, slender grasses, the inflorescence composed of spike-like racemes which are in whorls or somewhat scattered or crowded at the apices of the stems. Leaves flat. Spikelets narrow, in pairs or in threes on one side of the flattened rachis, one spikelet of each pair generally longer-pedicelled than the other. Glumes 3 or 4, the 2 or 3 outer ones thin, the first sometimes wanting, the fourth or flowering glume glabrous and shining, at length hardened, enclosing a palea, of similar texture, and a perfect flower. (Latin "finger" in allusion to the digitate inflorescence.)

A genus of considerable size in all tropical and temperate regions, reduced by some botanist to *Panicum* and others to *Paspalum*, about 7 species in the Philippines.

1. Spikelets about 3 mm long.
    2. Marginal nerves of the second glume densely villous-ciliate with spreading hairs.......... 1. *D. ciliaris*
    2. Glumes not ciliate.
        3. Spikes digitate or in pairs at the apex of the stem.... 2. *D. sanguinalis*
        3. Spikes somewhat scattered along the rachis; sheaths hirsute. 3. *D. consanguinea*
1. Spikelets about 1.5 mm long.
    2. Spikes digitate or approximate at the apex of the stem.
        3. Spikes usually 2 or 3, less than 5 cm long; stems short, erect from a prostrate creeping base.......... 4. *D. longiflora*
        3. Spikes more numerous, 10 or less, frequently 10 cm long; stems elongated, erect, base scarcely prostrate.......... 5. *D. violascens*
    2. Spikes alternate, scattered on the somewhat elongated rachis. 6. *D. pedicellaris*

1. **D. CILIARIS** (Retz.) Pers. Halos (Tag.).

A rather slender, erect or suberect, branched grass 1 m high or less, the basal parts of the stem more or less decumbent. Leaves narrowly lanceolate, acuminate, 6 to 14 cm long, 3 to 5 mm wide, the sheaths loose, sparingly hirsute. Inflorescence exserted, of from 3 to 6 ascending or spreading spikes about 10 cm long, whorled at the apex of the stem. Spikelets 3 mm long, oblong-lanceolate, in pairs, one sessile, one pedicelled, on the lower surface of the flattened rachis, the empty glumes of the pedicelled spikelets densely ciliate on the marginal nerves with numerous, long, soft, spreading, often hooked hairs.

Roadsides and waste places, fl. more or less all the year and rather common about Manila, certainly introduced. India to Polynesia.

2. **D. sanguinalis** (L.) Scop., var. **australis** Thwaites.

A weak, slender, ascending, nearly glabrous grass usually less than 0.5 m high, the basal parts of the stems more or less decumbent. Leaves thin, acuminate, 5 to 10 cm long, 3 to 5 mm wide. Spikes slender, 2 to 4, ascending or spreading, 4 to 7 cm long, whorled at the apex of the stem. Spikelets oblong-lanceolate, 3 mm long, in pairs, one sessile and one pedicellate on the under surface of the flattened rachis, glabrous or nearly so.

In thickets etc., fl. all the year, widely distributed in the Philippines, variable. Tropical and temperate regions of the world (species), the variety India to Malaya.

3. **D. consanguinea** Gaudich.

Stems up to 1 m in length, the lower parts usually geniculate and somewhat prostrate. Leaves up to 20 cm in length, 6 to 12 mm wide, the sheaths usually lax, with scattered, long, stiff, white hairs arising from small papillae. Inflorescence long-exserted, consisting of from 6 to 18, 8 to 15 cm long spikes, somewhat scattered, fascicled, or whorled along the upper part of the rachis. Spikelets oblong-lanceolate, about 3 mm long.

In thickets and open places, fl. Nov.–March and probably in other months; widely distributed in the Philippines. India to Malaya and Polynesia.

4. **D. longiflora** (Gmel.) Pers.

A slender grass, the basal parts usually procumbent and rooting, the flowering stems erect or ascending, 10 to 30 cm high. Leaves narrowly lanceolate, acuminate, 2 to 6 cm long, 2 to 5 mm wide. Spikes 2 to 4, whorled at the apex of the stem, spreading or ascending 3 to 5 cm long, grayish-white. Spikelets pale-green, rarely purplish, 1.5 mm long, in pairs, one pedicellate and one sessile, the first glume usually wanting or very minute.

In waste places, yards, etc., occasional, fl. Aug.–Dec., widely distributed in the Philippines. India to China and Malaya.

5. **D. violascens** Link.

A slender, erect or ascending, usually tufted grass 40 to 90 cm high. Leaves narrowly lanceolate, acuminate, 3 to 10 cm long, 3 to 6 mm wide, ascending or spreading, mostly basal or subbasal. Spikes slender, grayish, 3 to 8, whorled at the apex of the stem, ascending or spreading, 5 to 12 cm long. Spikelets 1.5 mm long, crowded, in pairs on the lower side of the slender rachis, the flowering glume when mature usually dark-purple.

In fallow lands, borders of thickets etc., Masambong, fl. Aug.–Nov.; widely distributed in the Philippines. Tropics generally.

6. **D. pedicillaris** (Trin.) Prain.

A slender, erect, tufted annual 15 to 30 cm high. Leaves linear-lanceolate, acuminate, ascending, 1.5 to 6 cm long, about 2 mm wide. Spikes alternate, ascending or spreading, somewhat scattered, usually 3, sometimes only 2, 2.5 to 5 cm long, slender, grayish. Spikelets 1.5 mm long, in pairs or in groups of threes, in each group one subsessile, the others with slender pedicels as long as or longer than the spikelets.

In open, rather dry grass lands, Masambong, San Juan del Monte, etc., not common, fl. Aug.–Nov.; known from but three of four localities in Luzon. India.

22. ISACHNE R. Brown

Annual or perennial slender grasses. Leaves lanceolate or narrowly lanceolate, flat. Spikelets small or minute, in small, usually open panicles, subglobose or obovoid, 2-flowered. Glumes 4, the first and second thin, subequal, empty, the third and fourth somewhat thickened, paleate, each enclosing a usually perfect flower. Grain free within the hardened glume and palea. (Greek "equal" and "glumes.")

Species about 35, tropical and subtropical, about 9 in the Philippines, one in our area.

1. **I. miliacea** Roth. (*I. minutula* Kunth).

A very slender, glabrous or somewhat pubescent grass, the stems branched below, usually prostrate and rooting at the nodes, the flowering stems 10 to 20 cm high. Leaves lanceolate, acuminate, 1.5 to 4 cm long, 3 to 5 mm wide. Panicles exserted, usually ovate, lax or somewhat contracted, 2 to 4 cm long. Spikelets pale-green, rarely purplish, 1.5 mm long, their pedicels slender.

In open wet lands, especially in rice-paddies, etc., fl. more or less all the year; widely distributed in the Philippines. India to China, Malaya, and Polynesia.

23. PANICUM Linnaeus

Annual or perennial, fine or coarse grasses, of various habits. Leaves in our species flat, acute or acuminate, linear to lanceolate. Spikelets small, 1- or 2-flowered, terete or dorsally or laterally compressed, awnless, or in § *Echinochloa* awned. Glumes 4, the first and second empty the first much smaller than the others, second and third subequal 3- to many-nerved, oblong, ovate, or lanceolate; third paleate or not, enclosing a staminate flower or empty, the fourth paleate, enclosing a perfect flower, hardened in fruit, glabrous, usually shining. Stamens 3. Grain free within the fourth glume and the palea. (Ancient Latin name for the Italian millet.)

A very large genus, found in all tropical and temperate countries, about 35 species in the Philippines.

1. Spikelets terete or dorsally compressed; inflorescence various.
  2. Spikelets 1- to 4-seriate, close-set on the under side of the rachis of the spike, the spikes alternately arranged.
    3. Glumes smooth, awnless.
      4. Spikes shorter than the internodes........................ 1. *P. flavidum*
      4. Spikes longer than the internodes.
        5. Tip of spikes extended beyond the upper spikelets as a setiform bristle; spikes very numerous........................ 2. *P. punctatum*
        5. Tip of spikes not produced; spikes 2 to 4........ 3. *P. distachyum*

- 3. Empty glumes usually muricate, the second and third cuspidate or awned.
  - 4. Lower spikes as long as or shorter than the internodes; third glume awnless or nearly so; spikelets 2.5 to 3 mm long. 4. *P. colonum*
  - 4. Lower spikes much longer than the internodes; coarse erect grasses, the spikelets usually long-awned.
    - 5. Spikelets nearly 5 mm long, green or purplish; an aquatic grass........ 5. *P. stagninum*
    - 5. Spikelets 3.5 to 4 mm long, usually purplish........ 6. *P. crusgalli*
- 2. Spikelets crowded in spiciform or narrow, cylindric panicles, or pedicellate on the spreading, racemosely arranged panicle-branches.
  - 3. Branches elongated, ascending or spreading........ 7. *P. auritum*
  - 3. Panicles dense, cylindric.
    - 4. Spikelets about 5 mm long, acuminate; a coarse, perennial, aquatic grass........ 8. *P. amplexicaule*
    - 4. Spikelets about 2.5 mm long; a slender, erect annual grass. 9. *P. indicum*
- 2. Spikelets in open, diffuse panicles.
  - 3. First glume as long as the spikelet or nearly so; spikelets prominently acuminate........ 10. *P. caudiglume*
  - 3. First glume much shorter than the spikelet.
    - 4. Second glume decidedly shorter than the flowering glume; panicles simple........ 11. *P. nodosum*
    - 4. Second glume equaling or longer than the flowering glume; panicles decompound.
      - 5. Annual........ 12. *P. psilopodium*
      - 5. Perennial.
        - 6. Tall, leafy, 2 to 3 m high; cultivated........ 13. *P. maximum*
        - 6. Less than 2 m high.
          - 7. Panicle branches rather stiff, spreading; spikelets 3.5 to 4 mm long, aquatic or subaquatic........ 14. *P. paludosum*
          - 7. Panicle branches somewhat nodding; spikelets 3 mm long. 15. *P. repens*
- 1. Spikelets laterally compressed; small, slender, more or less prostrate, spreading grasses.
  - 2. Panicles very lax, open, the spikelets scattered........ 16. *P. warburgii*
  - 2. Spikelets densely crowded on the usually ascending branches. 17. *P. pilipes*

1. P. FLAVIDUM Retz.

A loosely tufted, erect, somewhat branched, rather coarse grass 0.5 to 1 m high, the stems somewhat compressed. Leaves linear-lanceolate, smooth, glabrous, acute or acuminate, 8 to 15 cm long, 5 to 10 mm wide, the lower sheaths usually loose. Inflorescence elongated, of erect, stout, scattered, racemosely arranged spikes shorter than the internodes, the spikes 1 to 2.5 cm long, about 5 mm wide. Spikelets very pale, densely arranged in 2 rows, divaricate, about 3 mm long.

Very common in open waste places, roadsides, etc., fl. all the year; throughout the Philippines at low altitudes, certainly introduced. Tropical Asia and Africa, Malaya.

2. P. punctatum Burm.

A stout, erect, perennial grass 1 to 1.5 m high, the base usually floating and rooting at the nodes, the stems stout, sometimes nearly 1 cm thick. Leaves 10 to 20 cm long, about 1 cm wide, acuminate, the sheaths dilated. Inflorescence slender, 30 to 60 cm long, of numerous, racemosely arranged spikes, the spikes 1 to 3 cm long, longer than the internodes, the rachis excurrent as a slender, sharp awn. Spikelets oblong-ovate, about 2.5 mm long, arranged in 2 rows.

In shallow pools and in low, wet ground, San Pedro Macati, Sept.–Dec.; not common in the Philippines. Tropical Africa, Asia, and Malaya.

3. P DISTACHYUM L.

A widely spreading, rather slender grass, the stems prostrate, branched, rooting at the nodes, often 1 to 2 m in length, the flowering branches erect or ascending, 20 to 40 cm high. Leaves narrowly lanceolate, acuminate, 8 to 20 cm long, 5 to 10 mm wide, glabrous, base broad, rounded. Inflorescence exserted, of 2 to 4, distant, usually spreading, 2 to 5 cm long, racemosely arranged spikes. Spikelets oblong-ovoid, acute, about 4 mm long, arranged in 2 rows, sessile or nearly so, green.

In waste places, open, fairly dry land, rather common, fl. all the year; widely distributed in the Philippines at low altitudes. India to China, through Malaya to Australia.

4. P. COLONUM. L.

Stems tufted, 10 to 40 cm high, often decumbent below. Leaves 5 to 12 cm long, 2 to 8 mm wide, acuminate. Inflorescence of from 4 to 8 racemosely arranged, short, dense spikes, the spikes 0.5 cm long, about 5 mm thick, spreading or appressed. Spikelets 2.5 to 3 mm long, single, in pairs, or in threes, in two rows, densely arranged, green or purplish, the outer glumes hispid on the nerves, awnless.

Along roadsides, in waste places, etc., common, fl. throughout the year; widely distributed in the Philippines. Troughout the tropics and in some temperate countries.

5. **P. stagninum** Retz. Balili (Tag.).

A coarse, erect, aquatic or subaquatic grass 1 to 1.5 m high, the lower parts often decumbent and rooting at the nodes, the stems 6 to 8 m thick. Leaves 20 to 40 cm long, 8 to 13 mm wide. Panicles 20 cm long or less, the spikes green or purple, distinctly longer than the internodes, spreading or ascending, 1.5 cm long, nearly 1 cm thick. Spikelets in pairs in two rows, nearly 5 mm long, the empty glumes hispid on the nerves, the third glume with a long or short awn.

In shallow water and in low, wet lands, rather common, fl. more or less all the year; widely distributed in the Philippines. India to Malaya. By some botanists reduced to the next species to which it is indeed very closely allied.

6. P. CRUS-GALLI L.

A coarse, erect, annual grass 0.6 to 1 m high. Leaves 10 to 20 cm long, 8 to 15 mm wide, acuminate. Panicles 10 to 20 cm long, usually narrowly pyramidal, the spikes numerous, ascending or spreading, 2.5 to 8 cm long, about 7 mm in diameter, green or purplish. Spikelets 3.5 to 4 mm long, the empty glumes hispid on the nerves, the awn of the third glume slender, 1 to 3 cm long, rarely wanting (var. *mutica* Doell.).

In open wet lands, waste places, etc., fl. all the year, widely distributed in the Philippines. Tropical and temperate region of the world.

7. **P. auritum** Presl.

A coarse, erect, perennial grass 1 to 2 m high, the stems simple or slightly branched, usually about 5 mm thick, sometimes rooting at the lower nodes. Leaves lanceolate, acuminate, 10 to 25 cm long, 0.7 to 2.5 cm wide, base broad, cordate or auriculate. Panicles 15 to 40 cm long, diffuse or contracted, according to the stage of development, the spike-like branches numerous, solitary or fascicled, 5 to 10 cm long, ascending or spreading, densely flowered. Spikelets very numerous, green or purplish, oblong-ovate, acute or slightly acuminate, 2.5 mm long.

Common in low, wet lands, fl. more or less throughout the year, but especially in the rainy season; widely distributed in the Philippines at low altitudes. India to China and Malaya.

8. **P. amplexicaule** Rudge.

A rather coarse, erect, aquatic or subaquatic grass 1 m high or less, the stems stout, usually decumbent and rooting at the lower nodes. Leaves flat, linear-lanceolate, acuminate, 15 to 25 cm long, 0.8 cm wide. Spikelets very numerous, narrowly lanceolate, acuminate, about 5 mm long, crowded in dense, cylindric, continuous or somewhat interrupted spike-like panicles 15 to 20 cm long, 1 to 1.5 cm in diameter.

In shallow water, margins of the Pasig River, in esteros, etc., but not abundant, fl. all the year; apparently quite widely distributed in the Philippines at low altitudes. Tropics generally.

9. **P. indicum** L.

A slender, erect, annual grass a few cm to about 1 m in height. Leaves linear-lanceolate or linear, acuminate, 5 to 15 cm long, 3 to 7 mm wide. Inflorescence a dense, cylindric or oblong, spiciform panicle, 1 to 10 cm long, about 5 mm in diameter. Spikelets green or purplish, oblong, straight or somewhat curved, about 2.5 mm long.

In open, usually damp grass lands, common, fl. more or less throughout the year; throughout the Philippines. Tropical Asia and Africa through Malaya to Australia.

10. P. CAUDIGLUME Hack.

A loosely tufted, somewhat hairy, erect or ascending annual grass, reaching a height of about 1 m. Leaves flat, lanceolate, hairy, 5 to 20 cm long. Panicles open, diffuse, very lax, decompound, 20 to 40 cm long, the branches capillary. Spikelets long-pedicelled, arranged toward the ends of the ultimate branchlets, purplish, ovate-lanceolate, 3 to 3.5 mm long, the first glume the longest, long-caudate-acuminate, the second and third glumes shorter, acute, of about equal length, the flowering glume oblong-elliptic, 1.5 mm long, shining.

In dry, well drained, fallow lands, near San Felipe Neri, fl. Nov.–Feb.; of local occurrence in Luzon and Palawan, certainly introduced. Java.

11. **P. nodosum** Kunth.

A rather weak grass with elongated, slender, prostrate stems, and erect or ascending branches 20 to 40 cm long. Leaves thin, lanceolate, acuminate, 5 to 8 cm long, 5 to 8 mm wide. Panicles weak, somewhat exserted, 10 cm long or less, usually with from 2 to 4, solitary, ascending or spreading branches, the lowest one 5 to 7 cm long. Spikelets green or purplish, rather few, oblong, about 3 mm. long.

In thickets, Pasay, Masambong; etc., fl. June–Oct.; widely distributed in the Philippines at low altitudes. Tropical Asia and Malaya.

12. **P. psilopodium** Trin.

A tufted, erect or ascending, more or less branched, glabrous, annual grass 15 to 30 cm high. Stems rather slender, base more or less decumbent. Leaves narrowly lanceolate, acuminate, 5 to 9 cm long, 3 to 5 mm wide, the sheaths rather loose, mostly longer than the internodes, glabrous. Panicles diffuse, 7 to 10 cm long, the branches solitary, spreading or ascending, alternate, glabrous. Spikelets narrowly ovate, acute, glabrous, 3 mm long, green or slightly purplish, the pedicels long, scabrid.

Novaliches road, San Juan del Monte, etc., on banks and in open places, not common, fl. July–Nov.; apparently rare in the Philippines, or at least local. India and Ceylon to Burma and the Malay Peninsula.

* 13. P. MAXIMUM Jacq. Guinea Grass.

An erect, rather coarse, perennial grass 2 to 3 m high, the stems often nearly 1 cm in diameter near the base, the nodes bearded. Leaves linear-lanceolate, acuminate, numerous, 20 to 30 cm long, 1 to 1.5 cm wide. Panicles diffuse, 20 to 30 cm long, the branches whorled, slender, the lower ones 15 to 20 cm long. Spikelets numerous, green, pedicellate, 3 mm long, elliptic-oblong, acute or obtuse, glabrous.

Of recent introduction and considerably cultivated as a forage grass, but not spontaneous, fl. all the year. A native of Africa, now cultivated in many tropical countries.

14. **P. paludosum** Roxb.

An aquatic perennial grass, the flowering stems erect or ascending, often nearly 1 m tall, the basal parts floating or rooting in the mud, soft, often 1 cm in diameter. Leaves 15 to 25 cm long, 1.5 cm wide or less, acuminate, scabrid, thin. Panicles only slightly exserted from the uppermost sheath, at first contracted, ultimately very diffuse, usually about 20 cm long, often as wide as long, the branches alternate or somewhat whorled, branched from the base. Spikelets very numerous, lanceolate, acuminate, green, 3.5 to 4 mm long, the pedicels solitary, scabrid, thickened upward.

In marshy borders of the Pasig River, esteros etc., not very common, fl. all the year; widely distributed in the Philippines at low and medium altitudes. India to southern China and Malaya.

15. **P. repens** L.

An erect, rather wiry, perennial grass 0.4 to 1 m high, the rootstocks stout, the whole plant somewhat glaucous, the stems below somewhat prostrate or creeping. Leaves linear-lanceolate, 8 to 15 cm long, 5 to 8 mm wide, acuminate, scabrid. Panicles exserted, 7 to 18 cm long, somewhat diffuse, the branches slender, erect or ascending, sometimes nodding, elongated, scattered, 1 to 3 at each node. Spikelets oblong-ovate, acute or slightly acuminate, 3 mm long.

Very common in low open grass lands, fl. all the year; widely distributed in the Philippines at low altitudes. Tropics generally, and some subtropical and subtemperate countries.

16. **P. warburgii** Mez.

A weak, prostrate grass, the stems slender, rooting at the nodes and sending up short, panicle-bearing branches 5 to 15 cm in length. Leaves narrowly lanceolate, acuminate, 1.5 to 5 cm long, 2 to 5 mm wide. Panicles slightly exserted, diffuse, 1.5 to 5 cm long, the branches few, spreading, usually branched from the base. Spikelets few, green or purplish, long-pedicelled, obovoid, somewhat laterally compressed, 1.5 mm long.

In thickets, Pasay, Masambong, etc., fl. Aug.–Nov.; not uncommon in the Philippines, and by some botanists considered only as a variety of *Panicum patens* L., a species of wide Indo-Malayan distribution.

17. **P. pilipes** Nees & Arn.

A slender, branched, widely spreading grass, the stems prostrate and rooting at the nodes, often 1 m or more in length, the flowering branches erect or ascending, 30 to 50 cm long. Leaves lanceolate, acuminate, 4 to 10 cm long, glabrous or slightly hairy. Panicles exserted, 4 to 10 cm long, the branches few, distant, ascending, densely many-flowered, the branchlets many, short, fastigiate. Spikelets crowded, brown or greenish, laterally compressed, about 1.6 mm long, glabrous or slightly pubescent, shortly pedicelled.

In thickets along trails, Masambong, fl. Nov.-Apr.; widely distributed in the Philippines. Tropical Asia to Madagascar, through Malaya to Australia and Polynesia.

24. OPLISMENUS Beauvois

Slender, ascending or decumbent, mostly annual grasses, the leaves thin, flat, ovate to lanceolate. Spikelets 1-flowered, sessile or subsessile, densely arranged along one side of the racemosely arranged spikes. Glumes 4, the first short, 3-nerved, tipped with a long straight awn, the second short, awn short or none, the third longest, 5-nerved, the fourth or flowering glume lanceolate, hardened. Palea similar to the flowering glume in texture. (Greek "awned.")

Species 25 to 30, most tropical countries, many not well-defined, three in the Philippines.

Spikelets about 2 mm long, densely crowded, the awns very slender. 1. *O. burmannii*
Spikelets at least 3 mm long, scattered, awns stout............ 2. *O. compositus*

1. **O. burmannii** (Retz.) Beauv.

A rather slender, somewhat pubescent, annual grass, the stems branched, prostrate and rooting below, the flowering stems 20 to 40 cm high. Leaves thin, lanceolate, acuminate, 3 to 5 cm long, 6 to 10 mm wide. Panicles pale-green, erect or nodding, 3 to 5 cm long, the spikes 5 to 10, 2 cm long or less. Spikelets about 2 mm long, the glumes awned, awns very slender, that of the first glume about 1 mm long.

In dry bamboo thickets near Fort McKinley, fl. Aug.–Dec.; widely distributed in the Philippines. Tropical Africa, Asia through Malaya, northward to Japan.

2. **O. compositus** (L.) Beauv.

A variable, spreading or ascending, more or less hairy grass, the stems prostrate and rooting below, branched, the flowering branches ascending, 40 to 60 cm high. Leaves flat, lanceolate, acuminate, 4 to 10 cm long, 1 to 2 cm wide. Panicles exserted, of 5 to 8 spreading or ascending, green or purplish, 2 to 10 cm long spikes. Spikelets somewhat scattered, 3 mm long, the awn about 1 cm long.

In thickets near Guadalupe, fl. Dec.–Feb.; widely distributed in the Philippines. Tropics generally.

25. CENCHRUS Linnaeus

Annual or perennial, erect grasses with flat leaves and dense, cylindric spikes, composed of ovate involucres consisting of hardened spines connate below and forming a cup, bristly at the base, enclosing 2 to 6 spikelets. Involucres jointed to the rachis, deciduous. Glumes 4, the first and second empty, the first small, the second shorter than or equaling the third, the third enclosing a palea and sometimes a staminate flower, the fourth chartaceous, enclosing a palea and a perfect flower. Stamens 3. (Ancient Greek name for Italian millet.)

A small genus of tropical and some temperate regions, a single introduced species in the Philippines.

1. C. ECHINATUS L. Cauit-cauitan (Tag.).

An erect, somewhat tufted, branched grass 0.2 to 0.8 m high, the lower parts of the stems sometimes prostrate and rooting at the nodes. Leaves 8 to 30 cm long, 0.5 to 1 cm wide. Spikes dense, cylindric, 3 to 10 cm long, about 1 cm in diameter, involucres 20 to 50 or more, densely arranged, green, about 5 mm in diameter, the spines 2 to 3.5 mm long, the basal bristles numerous. Spikelets about 5 mm long.

Common in waste places, along roadsides, etc., in and about towns throughout the Philippines; introduced from tropical America.

26. SETARIA Beauvois

Erect, slender or coarse, annual grasses, the leaves flat, the spikelets arranged in dense, cylindric, spike-like panicles, or the panicles sometimes lax, open, each spikelet subtended by an involucel of from one to many, slender, persistent, scabrid bristles. Spikelets jointed on the branches, unawned, the glumes 4, the first shorter than the others, the second and third subequal, all thin, the fourth coriaceous or hardened, shining, smooth or rugose, enclosing a palea of similar texture and a perfect flower. (Latin "bristle.")

Species 25 or 30, temperate and tropical, 5 in the Philippines.

1. Inflorescence a dense cylindric spike-like panicle.
   2. Bristles few, 1 to 3 at the base of each spikelet .... 1. *S. viridis*
   2. Bristles many at the base of each spikelet, yellow or purplish. 2. *S. flava*
1. Inflorescence a lax, open, few-flowered panicle, bristle one subtending each spikelet .... 3. *S. laxa*

1. S. VIRIDIS (L.) Beauv.

A slender, tufted, erect, annual grass, the stems usually branched below, 10 to 60 cm high. Leaves 5 to 20 cm long, 2 to 8 cm wide, flat, acuminate. Panicles dense, cylindric, spike-like, 2 to 8 cm long, about 1 cm in diameter, green. Spikelets about 2 mm long, elliptic, the flowering-glume elliptic, faintly transversely rugose or pitted.

Along roadsides, rare; introduced from America or Europe; widely distributed in the Old World, introduced in America.

2. **S. flava** (Nees) Kunth.

A slender, erect, unbranched, loosely tufted or scattered, annual grass 1.3 m high or less. Leaves flat, 10 to 40 cm long, 3 to 7 mm wide. Panicles dense, cylindric, 2 to 10 cm long, erect or somewhat nodding, yellowish or purplish, about 1.5 cm in diameter including the numerous, usually spreading bristles. Spikelets 2 mm long, the flowering glume distinctly transversely rugose.

In open, rather dry grass lands, San Pedro Macati, Masambong, etc., fl. July–Dec.; widely distributed in the Philippines. India to southern China, Malaya, and Polynesia.

3. **S. laxa** Merr.

A tufted, lax, spreading or ascending, branched, nearly glabrous plant, the stems slender, reaching a length of 1.2 m or less. Leaves thin, narrowly lanceolate, acuminate, 6 to 25 cm long, 6 to 10 mm wide. Panicles long-exserted, lax, 10 to 30 cm long, the branches remote, spreading or ascending, slender, branched from near the base, the lower ones up to 10 cm long. Spikelets scattered, solitary, pedicelled, green or purplish, about 2 mm long, the involucre reduced to a solitary, slender, scabrid awn, 5 to 10 mm in length, terminating the branches, branchlets, and also on most of the pedicels.

In thickets, opposite Guadalupe, Pasig etc., fl. Nov.–Jan.; at present known from but few localities in Luzon, but with a very closely allied if not identical form in Java.

27. CHAMAERAPHIS R. Brown

Prostrate, glabrous, marsh or aquatic grasses. Leaves flat, linear or lanceolate. Spikelets narrowly lanceolate, 1- or 2-flowered, subsessile and somewhat secund in spike-like branches that are racemosely arranged in a simple panicle, the branches produced beyond the upper spikelet as a slender awn. Glumes 4, the first very small, truncate, thin, the second longest, acuminate or narrowed into a slender awn, the third lanceolate, acute or awned-acuminate, enclosing a palea and a male or neuter flower, the fourth small, oblong, thin, enclosing a female or perfect flower. (Greek "ground" and "needle," in allusion to the awns.)

Species about 6, tropical Asia to Australia, 1 in the Philippines.

1. **C. aspera** (Koen.) Nees.

Stems elongated, floating, branched, often 1 to 2 m in length, the flowering branches ascending, 20 to 30 cm long. Leaves linear-lanceolate, acuminate, 5 to 10 cm long, 3 to 6 wide. Panicles exserted, pyramidal, open, 6 to 11 cm long, the branches rather few, spreading, 2 to 5 cm long. Spikelets few or many, linear-lanceolate, acuminate, 6 to 7 mm long.

In pools of stagnant water, local, fl. Aug.–Jan.; widely distributed in the Philippines. India to China, Malaya, and Australia.

28. THUAREA Persoon

A slender, creeping, maritime grass, rooting at the nodes, much-branched. Leaves flat, short. Spikes surrounded by a sheathing leaf, the rachis flat, thin, the base at length accrescent, dilated, and enclosing the one or two perfect spikelets. Spikelets 1-seriate, jointed on one face of the rachis, the upper 4 to 6 male, the lower 1 or 2 female or perfect. Glumes 3 or 4, the first small, hyaline or wanting in the staminate ones, the second empty, the third and fourth subequal. Grain free within the glume, but with the rest of the spikelets enclosed in the thick, hardened base of the rachis, forming a beak which bores into the ground. (In honor of L. M. A. du Petit-Thouars, a French botanist.)

A monotypic genus.

1. **T. involuta** (Forst.) R. Br. (*T. sarmentosa* Pers.).

A slender, widely creeping grass, the leaves narrowly lanceolate, 2 to 5 cm long, 3 to 5 mm wide. Spikes 1 cm long or less. Fruit 0.8 to 1 cm long, shaped like a bird's head and beak.

In thickets back of the beach, Parañaque, sometimes in pure sand of the beach, fl. Aug.–Jan.; throughout the Philippines along sandy seashores. Ceylon to Madagascar, Malaya, Australia, and Polynesia.

29. SPINIFEX Linnaeus

Coarse, rigid, prostrate, widely spreading, dioecious grasses, the leaves rigid, involute. Male spikelets 1- or 2-flowered, subsessile, jointed on rigid, peduncled, many-flowered spikes which are arranged in umbels surrounded by spathaceous leafy bracts; glumes 4, the first and second empty, the third and fourth paleate. Female spikelets collected in large globose heads of radiate, spreading, very long, awn-like spikes, each with a single spikelet at the base, the glumes about as in the staminate spikelets but narrower, the fourth one pistillate. (Latin "spine.")

Species 4, mostly in Australia, 1 in the Philippines.

1. **S. littoreus** (Burm. f.) Merr. (*S. squarrosus* L.).

A gregarious, coarse, stiff, prostrate, widely spreading grass, the stems often 10 to 15 m long, rooting at the nodes and sending up short, stout flowering branches. Leaves stiff, rigid, involute, 10 to 20 cm long, the sheaths often imbricating. Male inflorescences about 15 cm in diameter, the spikelets about 1 cm long, the female inflorescence globose, 20 to 30 cm in diameter, including the long, slender, needle-like awns.

Along the seashore, Parañaque, fl. Aug.–Jan.; widely distributed in the Philippines on sandy seashores. India to China and Malaya.

The globose female heads become detached and are rolled along the beach by the wind, thus dispersing the seeds.

30. ORYZA Linnaeus

Tall, leafy, annual grasses, the leaves flat, long. Panicles more or less elongated, the branches slender. Spikelets many, jointed on the panicle-branches, oblong, laterally compressed, their pedicels annular at the top. Glumes 2 or 3, the first and second much the smallest, scale- or bristle-like, or none, the third chartaceous, obtuse, acute, or awned, 3- or 5-nerved, the palea as long as the glume and similar to it, keeled. Grain free or adnate to the glume and palea. (From its Arabic name.)

Species 6 or 8, tropical, 3 in the Philippines.

Spikelets 7 to 9 mm long; cultivated.. 1. *O. sativa*
Spikelets 4 mm long.. 2. *O. manilensis*

*1. O. SATIVA L. Palay (Tag.); Arroz (Sp.); Rice.

An erect, slender or stout, variable, annual grass 1.5 m high or less. Leaves flat, 15 to 30 cm long, up to 2 cm wide. Panicles erect or nodding, 25 cm long or less. Spikelets green or purple, 7 to 9 mm long, awned or awnless. (Fl. Filip. *pl. 102.*)

Cultivated throughout the Philippines but nowhere wild, and of prehistoric introduction; exceedingly variable, scores of varieties being recognized by the natives. Cultivated in most tropical and some subtemperate countries, a native of tropical Asia.

2. **O. manilensis** Merr.

A slender, weak, erect or ascending annual grass 0.5 to 1.5 high. Leaves 7 to 20 cm long, 5 to 7 mm wide, acuminate, scabrid. Panicles exserted, slender, 6 to 12 cm long, the few branches appressed or ascending. Spikelets green, about 4 mm long, the first glumes small, thin, about 1 mm long, the flowering glume and palea hispid, the awn to the flowering glume slender, straight, scabrid, 10 to 12 mm long.

Along small streams, Balintauac, opposite Fort McKinley, etc., fl. July–Dec. Known only from Luzon and of local occurrence.

31. LEERSIA Swartz

Tall slender grasses with flat leaves and rather small panicles. Spikelets 1-flowered, oblong, laterally compressed, awnless, the empty glumes wanting. Flowering glume, strongly nerved, ciliate on the keel, awnless. Palea as long as the glume. Stamens 6 or fewer. (In honor of J. D. Leers, a German pharmacist and botanist.)

Species about 8, chiefly American, one in the Philippines.

1. **L. hexandra** Sw. Barit (Tag.); Zacate (Sp.-Fil.).

A weak, ascending or suberect, slender grass about 0.5 m high, the stems below somewhat prostrate and rooting at the nodes. Leaves linear-lanceolate, acuminate, 5 to 20 cm long, 3 to 7 mm wide. Panicles exserted, ovoid or oblong, 5 to 12 cm long, the branches slender, suberect or spreading. Spikelets oblong, 3 to 3.5 mm long, one-sided, pale-green, the keels of the flowering glume and palea ciliate.

The commonly cultivated grass usually known as "zacate" and the chief source of green forage in Manila. Common in low, wet lands, fl. all the year; widely distributed in the Philippines. Tropics generally.

32. SPOROBOLUS R. Brown

Perennial or annual, slender or rather coarse, usually tufted grasses. Leaves flat or, when dry, convolute. Spikelets small, usually 1-flowered, in open or close, sometimes spiciform panicles, awnless. Glumes 3, thin, usually nerveless, the first and second unequal, the third longer or shorter than the first two. Grain loose within the glume and palea, the pericarp or its epidermis usually loose. (Greek "seed" and "to cast forth.")

Species about 80, tropical and temperate regions, about 4 in the Philippines.

Empty glumes both much shorter than the flowering glume.. 1. *S. indicus*
Empty glumes nearly or quite as long as the flowering glume. 2. *S. virginicus*

1. **S. indicus** (L.) R. Br.

A usually rather densely tufted, perennial, slender, wiry grass, the stems erect, unbranched, 1 m high or less. Leaves flat, or, when dry, convolute, 10 to 20 cm long. Panicles slender, erect or somewhat nodding, green, lax or somewhat spiciform, 10 to 35 cm long, the branches scattered, fascicled, 5 to 7 cm long, spreading or ascending. Spikelets about

1.5 mm long, the first and second glumes less than one-half as long as the flowering glume.

In waste places, roadsides, etc., scattered, fl. all the year; widely distributed in the Philippines. India to China and Malaya.

2. **S. virginicus** (L.) Kunth.

A rather slender perennial grass with prostrate, creeping stems, the erect or ascending flowering branches 8 to 30 cm high. Leaves close-set 2-ranked, spreading, convolute when dry, 1.5 to 7 cm long. Panicles rather dense, spike-like, pale, 5 to 6 cm long. Spikelets about 1.5 mm long, the first and second glumes acute, nearly as long as the flowering glume.

In open grassy places along tidal streams, Malate, Malabon, etc., fl. June–Sept. Along the seashore throughout the tropics and in some temperate regions.

33. ARISTIDA Linnaeus

Annual or perennial, slender or coarse, erect grasses, the leaves slender. Spikelets usually in lax panicles, 1-flowered. Glumes 3, the first and second empty, narrow, keeled, persistent, the third narrow, rigid, cylindric or convolute, acuminate, the tip produced into a long, 3-partite, naked or feathery awn which is often twisted below the branches. (Latin "awn" in allusion to the awned flowering glumes.)

Species more than 100 in all warm countries, 3 or 4 in the Philippines.

1. **A. cumingiana** Trin. & Rupr.

A very slender, tufted, glabrous, annual grass 6 to 30 cm high. Leaves filiform, up to 10 cm long. Panicles purple, open, lax, 5 to 12 cm long, the branches and pedicels capillary. Spikelets purple, long-pedicelled, lanceolate, 3 to 3.5 mm long, the second glume longer than the first, the flowering-glume about as long as the first, the awn slender, 8 to 10 mm long, the lateral arms about one-half as long as the median one.

In open dry grass lands, La Loma, Masambong, etc., fl. Dec.–Feb.; widely distributed in the Philippines but of local occurrence. India to China; also in tropical Africa.

34. DIPLACHNE Beauvois

Tall, tufted, annual or perennial grasses. Leaves flat, narrow. Spikelets many-flowered, spicately arranged on the slender branches of a simple panicle, the spikes not jointed at the base; rachilla jointed at the base and beneath each flowering glume, not produced beyond the uppermost glume. First and second glumes empty, unequal, obtuse, thin, 1-nerved, persistent. Flowering glumes several, oblong, 1- to 3-nerved, 2- to 4-toothed at the tips, mucronate or awned. Grain free within the glumes and palea. (Greek "two" and "lobed" in allusion to the toothed or lobed flowering glumes.)

Species about 15, in most warm regions, one in the Philippines.

1. **D. fusca** (L.) Beauv.

A tufted, rather stout, erect, glabrous grass, 40 cm to 1 m high. Leaves 6 to 50 cm long, 6 mm wide or less, flat, scabrid, the sheaths smooth. Panicles exserted, 10 to 30 cm long, pale-green, erect or nodding, the spikes numerous, spreading or ascending, alternate, slender, 5 to 11 cm long. Spikelets rather distant, 7 to 10 mm long, linear, 5- to 8-flowered.

In low lands, especially near the sea, fl. all the year; widely distributed in the Philippines, but local. Tropical Asia and Africa through Malaya to Australia.

35. CENTOTHECA Desvaux

A rather tall perennial grass with broad leaves. Panicles terminal, the branches long, spreading or ascending, spike-like. Spikelets 1- or 2-flowered, secund, not jointed on the very short pedicels, the rachilla jointed at the base and between the flowering-glumes. Glumes 5, the first and second oblong-ovate, keeled, empty, the flowering-glumes oblong, 7-nerved, naked, or the upper one bearing soft, erect or deflexed, spines above the middle. (Greek "point" or "pin" and "receptacle" in allusion to the spiny upper glume.)

Species one, or 2 or 3 closely allied forms, Tropical Asia, Africa, Malaya and Australia, the following in the Philippines.

1. **C. latifolia** (L.) Trin. (*C. lappacea* Desv.).

Erect, rather stout, 0.25 to 1 m high, glabrous or slightly hairy. Leaves broad, lanceolate, acuminate, 7 to 15 cm long, 1 to 3 cm wide. Panicles terminal, 10 to 20 cm long, broad, the branches numerous, spreading, smooth. Spikelets green, about 5 long, numerous, pedicelled.

In thickets, Masambong, fl. Nov.–Jan.; common and widely distributed in the Philippines in forests and thickets, possibly introduced. Tropical Africa and Asia through Malaya to Australia and Polynesia.

36. PHRAGMITES Trinius

Coarse, tall, perennial grasses with long flat leaves and 3- to 7-flowered spikelets in large, decompound terminal panicles, not jointed on the pedicels. Rachilla jointed between the flowering glumes, silky-penicillate with very long hairs. Glumes all glabrous, the first and second unequal, oblong-lanceolate, 3-nerved, thin, persistent, the third much longer, the flowering glumes subulate-lanceolate, hyaline, subaristate. (Greek "growing in hedges" in allusion to its habit.)

A small genus in most tropical and warm countries, 2 species in the Philippines.

1. **P. vulgaris** (Lam.) Trin. (*P. communis* Trin.). Tambó (Tag.).

A coarse erect grass 1.5 to 3.5 m high, the stems nearly 1 cm thick. Leaves up to 50 cm long and 2.5 cm wide. Panicles somewhat nodding, 30 to 50 cm long, brownish, rather dense, very many flowered, the branches slender. Spikelets linear, about 1 cm long.

In low wet places along esteros etc., fl. Aug.–Dec.; widely distributed in the Philippines. Cosmopolitan.

37. ERAGROSTIS Beauvois

Annual or perennial, the stems erect or ascending. Leaves narrow. Spikelets few- to many-flowered, in open or contracted panicles, the rachilla jointed, breaking up or not. Spikelets laterally compressed. Glumes many, the first and second much shorter than the spikelet, equal or unequal, 1-nerved, or the second 3-nerved. Flowering glumes densely arranged, overlapping, deciduous, 3-nerved, mostly containing perfect flowers. Palea deciduous with its glume, or persistent. Stamens 2 or 3. Grain minute, free. (Greek "a spring" and "grass.")

A large genus in all warm and tropical countries, about 13 in the Philippines.

1. Rachilla of spikelets more or less jointed, breaking up from above downward. (§ CATACLASTOS.)
  2. Panicles 10 cm long or less.
    3. Stems not viscid below the panicles.. 1. *E. tenella*
    3. Stems viscid below the panicles.
      4. Panicles open, rather lax.. 2. *E. viscosa*
      4. Panicles dense, spike-like.. 3. *E. mangalorica*
  2. Panicles 20 to 40 cm long.. 4. *E. interrupta*
1. Rachilla of spikelets tough, persistent; flowering glumes falling away from its base upward. (§ PTEROESSA.)
  2. Panicle-branches elongated, spreading or ascending, the spikelets scattered, pedicellate.
    3. Annual; spikelets green or purplish.
      4. Spikelets ovate to broadly oblong, 5 to 10 mm long 5. *E. unioloides*
      4. Spikelets linear to linear-oblong.
        5. Panicle-branches solitary, often spreading; spikelets 1 to 1.5 cm long.. 6. *E. distans*
        5. Panicle-branches ascending, the lower ones fascicled; spikelets about 5 mm long.. 7. *E. pilosa*
    3. Perennial; spikelets plumbeous.. 8. *E. elegantula*
  2. Panicle-branches short, appressed, distant, the spikelets densely arranged, sessile.. 9. *E. spartinoides*

1. **E. TENELLA** (L.) R. & S. (*E. plumosa* Link).

A slender, densely tufted, glabrous annual 20 to 50 cm high. Leaves linear, acuminate, 2 to 10 cm long, 2 to 3 mm wide. Panicles oblong, rather open, 5 to 10 cm long, the branches solitary, spreading or ascending, slender. Spikelets pale, long-pedicelled, about 2 mm long, the flowering glumes 4 to 6, less than 1 mm long (Fl. Filip. *pl. 67, E. plumosa*).

In waste places, common, fl. all the year; throughout the Philippines, certainly introduced. Tropical Asia, Africa, and Malaya.

2. **E. VISCOSA** (Retz.) Trin.

Similar to the preceding but stiffer, stouter, usually taller, reaching 1 m in height, the culms viscid below the panicle, the spikelets up to 5 mm long, often purplish, flowering glumes more numerous, up to 15 in each spikelet.

In similar habitats and with about the same range as the preceding; certainly introduced here.

3. **E. MANGALORICA** Hochst.

A densely tufted, rather stiff grass 20 to 40 cm high. Leaves 3 to 5 cm long, about 3 mm wide, acuminate. Culms viscid below the panicles. Panicles contracted, very dense, spiciform, 2 to 4 cm long, less than 1 cm in diameter, the branches very short. Spikelets densely arranged, pale or purplish, 3 to 4 mm long, the flowering-glumes 6 to 9, about 1 mm long.

In dry grass lands, fl. July–Sept.; not common in Luzon, certainly introduced. India.

4. **E. Interrupta** (Lam.) Doell.

An erect, loosely tufted grass 0.8 to 1.5 m high. Leaves 12 to 20 cm long, 3 to 5 mm wide. Panicles elongated, erect, 20 to 40 cm long, contracted or somewhat open, the branches slender, usually fascicled, often up to 12 cm long. Spikelets pedicelled, very numerous, pale, 2 to 3 mm long, the flowering glumes 6 to 10, about 1 mm long.

In open wet lands near San Pedro Macati, fl. Sept.–Dec.; widely distributed in the Philippines. Tropical Asia, Africa, and Malaya.

5. **E. unioloides** (Retz.) Nees.

An annual, erect, tufted or somewhat scattered, rather slender, glabrous grass 20 to 40 cm high. Leaves narrowly lanceolate, acuminate, flat, 5 to 9 cm long, 5 mm wide or less. Panicles exserted, oblong-ovoid, lax, open, 8 to 15 cm long, the branches slender, simple, solitary, distant, the lower ones about 5 cm long. Spikelets long-pedicelled compressed, oblong-ovate or broadly ovate, 5 to 10 mm long, usually purplish. Flowering glumes numerous, about 2 mm long, falling away from the base upward, the rachilla tough, persistent.

On ledges along streams, Masambong, fl. Nov.–Feb.; occasional in similar habitats in Luzon. Widely distributed in tropical Asia, introduced in Florida.

6. **E. distans** Hack.

A very slender, erect, loosely tufted, annual grass, 20 to 40 cm high. Leaves 5 to 10 cm long, 2 mm wide or less. Panicles pale, lax, erect, 10 cm long or less, the branches few, solitary, distant, more or less spreading, pale. Spikelets rather few, scattered, pedicelled, linear or oblong-linear, 1 to 1.5 cm long, the flowering glumes 20 to 40, about 2 mm long.

In open dry grass lands, La Loma to San Pedro Macati, fl. Nov.–Feb. Known only from Luzon.

7. E. PILOSA (L.) Beauv.

A tufted, slender, erect annual 15 to 50 cm high, the stems usually somewhat geniculate below. Leaves 5 to 12 cm long, 2.5 mm wide or less. Panicles lax, erect or somewhat nodding, 8 to 15 cm long, the branches slender, the lower ones fascicled, up to 8 cm long. Spikelets long-pedicelled, 4 to 6 mm long, 9- to 13-flowered, the flowering glumes 1 to 1.2 mm long.

Waste places, Cementerio del Norte, apparently of recent introduction, fl. Aug.–Nov. In most warm countries.

8. **E. elegantula** (Kunth.) Steud.

A tufted, somewhat rigid, perennial grass about 1 m high, more or less glaucous. Leaves 10 to 15 cm long, 2.5 to 5 mm wide, acuminate. Panicles somewhat nodding, rather lax, 7 to 20 cm long, the branches solitary, naked below. Spikelets numerous, long-pedicelled, scattered, oblong, about 7 mm long, plumbeous, each with from 10 to 16 flowers, the flowering glumes nearly 2 mm long.

In open grass lands, Caloocan to Masambong, fl. all the year; widely distributed in the Philippines. Tropical Asia through Malaya to Australia.

9. **E. spartinoides** Steud.

A rather densely tufted, slender but somewhat stiff perennial 15 to 50 cm high. Leaves 4 to 10 cm long, 2 to 4 mm wide, usually involute when dry. Panicles slender, strict, 5 to 10 cm long, of distant, solitary, short, usually appressed branches, the branches densely flowered, 2 cm long or less. Spikelets appressed, sessile, 4 to 15 on each branch, 5 to 9 mm long, the flowering glumes 8 to 16, about 1.5 mm long.

In open grass lands, Caloocan to La Loma, fl. all the year. Known only from Luzon.

38. CYNODON Persoon

Perennial, slender, creeping grasses, the leaves narrow, flat. Spikelets small, 1- or 2-seriate, unilateral on 3 to 7, slender, digitately arranged spikes. Glumes 3, the first and second empty, thin, keeled, the third broader, thin, awnless. Grain oblong, free within the glumes. (Greek "dog" and "tooth.")

Species 5 or 6, mostly Australian, 2 in the Philippines.

Spikes 3 or 4, mostly less than 3 cm long; flowering stems mostly less than 20 cm high.. 1. *C. dactylon*

Spikes 5 to 7, 8 to 10 cm long; flowering stems about 40 cm high. 2. *C. arcuatus*

1. C. dactylon (L.) Pers. Grama (Sp.-Fil.); Bermuda Grass.

Stems prostrate, usually widely creeping, branched and rooting at the nodes, sending up erect, short, flowering branches usually less than 20 cm high. Leaves 1.5 to 3 cm long. Spikes 3 or 4, 2 to 5 cm long, spreading, green or purplish. Spikelets imbricate, about 1.5 mm long.

In lawns, along roadsides, and in waste places generally, fl. all the year; throughout the Philippines, possibly introduced. In all warm countries.

2. C. arcuatus Presl.

An erect or spreading and ascending grass, the flowering stems 35 to 60 cm high, sometimes geniculate and rooting at the lower nodes. Leaves narrowly lanceolate, 6 to 15 cm long, 4 to 5 mm wide. Spikes 5 to 7, spreading, usually green, 8 to 10 cm long. Spikelets 2 mm long.

In open grass lands, San Pedro Macati, fl. Aug.–Jan.; rather widely distributed in Luzon. Endemic.

39. CHLORIS Swartz

Erect, annual or perennial, usually tufted grasses with flat or convolute leaves. Spikelets 2-seriate, on one side of the digitately arranged spikes, the rachilla sometimes produced beyond the third glume and bearing one or more empty glumes, awned. First and second glumes unequal, acute or mucronate, or the second awned, the third glume acute or cleft, usually awned.

Species about 40, mostly tropical, two in the Philippines, one apparently introduced. (Named for Chloris, the goddess of flowers.)

1. C. BARBATA (L.) Sw.

A tufted, erect grass 0.3 to 1 m high. Leaves flat, 10 to 20 cm long, linear-lanceolate. Spikes usually ascending, purple, 5 to 20, strict or flexuous, 5 to 8 cm long. Spikelets 2 to 2.5 mm long, with 3 slender awns.

Very common in open waste places, fl. all the year; in and about towns throughout the Philippines but certainly introduced. Tropics generally, but probably a native of tropical America.

40. ELEUSINE Gaertner

Annual or perennial tufted grasses. Leaves flat. Spikelets 3- to 12-flowered, all perfect (except the terminal one), sessile, 2- or 3-seriate, secund, imbricate, pointing forward, forming digitate or whorled spikes, laterally compressed, not jointed at the base; rachilla continuous between the flowering glumes. Glumes few or many, keeled, the first and second shorter than the flowering glumes, subequal or unequal, persistent. Flowering glumes 3-nerved. Grain free, pericarp hyaline, loose. (Name of a Greek town where Ceres, goddess of harvests, was worshipped.)

Species about 7, tropical and subtemperate regions, one in the Philippines.

1. E. INDICA (L.) Gaertn.

A rather stout, tufted, annual, erect, glabrous grass 10 cm to 1 m high. Leaves 10 to 30 cm long, sometimes involute when dry, 3 to 7 mm wide, distichous, rather flaccid, the sheaths flattened. Spikes 3 to 6, all in a terminal whorl, or one or two lower down, 2.5 to 10 cm long, 3 to 5 mm thick. Spikelets very numerous, crowded, 3- to 5-flowered, 3 to 4 mm long, the first glume 1-nerved, small, the second 3-nerved, the third and succeeding ones ovate, acute.

Very common in waste places, along roadsides, etc., fl. all the year; throughout the Philippines, probably of prehistoric introduction. Tropics of the Old World, naturalized in America.

41. DACTYLOCTENIUM Willdenow

More or less tufted annual grasses. Leaves flat. Spikelets numerous, crowded, imbricated, spreading, several-flowered, alternate in several rows in dense, 1-sided spikes which are digitately arranged at the apices of the stems. Glumes several, keeled, acute, or shortly awned, the two lower ones empty, slightly unequal, the upper glumes broader, the lower ones enclosing a 2-keeled palea and a flower, the upper ones empty. (Greek "finger" and "little comb.")

Species few, tropical, one in the Philippines.

1. D. ÆGYPTIUM (L.) Willd.

A rather coarse grass 15 to 60 cm high, the basal parts decumbent, usually more or less creeping and rooting, the flowering stems erect or ascending. Leaves 5 to 18 cm long 2 to 6 mm wide, the sheaths loose, imbricate. Spikes 3 or 4, rarely only 2, digitate, stout, often purplish, 1 to 5 cm long, 5 to 7 mm thick, the rachis excurrent at the tip, mucronate. Spikelets numerous, densely crowded, spreading, about 3 mm long, 3- or 4-flowered, the first glume ovate, acute, the second obliquely awned, the flowering glumes also cuspidate-awned, the cusps recurved.

Common in waste places, roadsides etc., fl. all the year; widely distributed in the Philippines, probably of prehistoric introduction. A native of the Old World where it is widely distributed, now extensively naturalized in the New World.

42. LEPTOCHLOA Beauvois

Annual, erect, usually tufted grasses with flat leaves, the slender, spike-like panicle-branches racemosely arranged on the elongated rachis. Spikelets small, compressed, several-flowered, sessile or shortly pedicelled, unilateral. Glumes 3 to many, thin, the first and second unequal, oblong or lanceolate, 1-nerved, empty, the others ovate, acute or obtuse, 3-nerved. Grain subglobose to obovoid, closely invested by the glume and palea. (Greek "slender" and "grass.")

Species about 15, tropical and subtropical, 2 in the Philippines.

1. **L. chinensis** (L.) Nees.

A tall, rather slender or somewhat stout, tufted, annual grass 0.6 to 1 m high. Leaves 10 to 30 cm long, 8 mm wide or less, the sheaths loose. Inflorescence 20 to 30 cm long, the spike-like branches numerous, slender, spreading, 6 to 10 cm long. Spikelets 2.5 to 3 mm long, green or purplish, about 5-flowered.

In shallow water, margins of the Pasig River, in low wet places, and sometimes in cultivated lands, fl. all the year; widely distributed in the Philippines. India to Japan southward to Australia.

43. BAMBUSA Schreber[1]

Erect shrubs or trees, tufted, the stem-sheaths broad, their blades usually triangular. Leaves shortly-petioled, the sheaths variously auricled. Inflorescence generally of large leafless or leafy panicles. Spikelets 1- to many-flowered, the empty glumes 1 to 4; flowering glumes ovate-lanceolate. Stamens 6. Ovary oblong or obovate, tip hairy. Grain oblong or linear oblong, the pericarp thin, adherent. (From the Indian name.)

Species about 55, tropical Asia, Malaya, and Australia, 5 in the Philippines.

1. Shrubby, slender, 2 to 3 m high .... 1. *B. glaucescens*
1. Arborescent coarse species.
  2. Stems naked below, spineless.
    3. Stems green .... 2. *B. vulgaris*
    3. Stems yellow, or yellow with green stripes.. 2. *B. vulgaris* var. *striata*
  2. Stems surrounded at the base with spreading and interlaced spiny branches .... 3. *B. blumeana*

1. B. GLAUCESCENS (Wild.) Sieb. (*B. nana* Roxb.). Cauayan China (Tag.).

A dwarfed shrubby species 1 to 3 m high, the stems 1 to 2 cm in diameter. Leaves small, linear-lanceolate or narrowly lanceolate, 3 to 10 cm long. Spikelets few, clustered or solitary on the branches, 1 to 3 cm long.

Occasionally cultivated as a hedge plant, introduced. A native of China and Japan, not as yet found in flower in the Philippines.

2. B. VULGARIS Schrad. Cauayan quiling (Tag.).

Erect, loosely tufted, the stems up to 17 m in height and 15 cm in diameter, green, naked at the base, not supplied with spiny branches. Leaves lanceolate, acuminate, up to 35 cm long and 4 cm wide, often smaller, the sheaths auriculate at the apex. Spikelets oblong, clustered along the branches of the inflorescence, about 1.5 cm long.

In thickets, Masambong, not uncommon, rarely flowering; widely distributed in the Philippines and probably not a native of the Archipelago, but of prehistoric introduction. Tropics generally.

*Var. STRIATA (Lodd.) Gamble.

Stems about 12 m high, 5 to 6 cm in diameter, spineless, naked at the base, the internodes 20 to 25 cm long, hard, rather bright-yellow, often striped with green. Leaves about 20 cm long, 1.5 to 4 cm wide.

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[1] For a consideration of the known species of Philippine bamboos see Gamble, J. S., "Bambuseae of the Philippine Islands." *Philip. Journ. Sci.* 5 (1910) *Bot.* 267–281.

Occasionally cultivated in Manila for ornamental purposes, introduced, native country uncertain, but probably China or Japan. The flowers of this variety are unknown; it is well characterized by its yellow stems.

*3. B. BLUMEANA Schultes f. Cauayan, Cauayan totoo (Tag.).

Stems 10 to 20 m high, 8 to 10 cm in diameter, the basal parts surrounded by stiff, branched, interlaced, spiny branches. Leaves 10 to 20 cm long, 1 to 2 cm wide. Panicles large. Spikelets slender, compressed, 2 to 3 cm long. (Fl. Filip. *pl. 100, B. arundinacea.*)

Very common in our area, and widely distributed throughout the settled regions of the Philippines, the common building bamboo of the Archipelago, rarely flowering; probably of prehistoric introduction. Malay Peninsula and Archipelago.

44. SCHIZOSTACHYUM Nees

Erect or climbing bamboos, the stems with thin or thick walls. Leaves narrow or broad, petioled. Inflorescence paniculate, the branches bearing scattered or close heads of sessile flowers, or the spikelets rarely scattered along the branches. Spikelets slender, usually fascicled; empty glumes 1 to 3, narrow, usually mucronate; flowering glumes 1 or 2, jointed below, convolute, elongated. Stamens 6, the filaments free. Fruit ovoid, beaked, crustaceous or hard. (Greek "split" and "spike.")

Species about 30, India to Polynesia, 11 in the Philippines.

1. **S. toppingii** Gamble.

An erect, unarmed, loosely tufted bamboo, the stems up to 2.5 cm in diameter and from 3 to 5 m or more high, the sheaths hairy. Leaves various, on young plants up to 40 cm long and 4.5 cm wide, on the branches crowded, much smaller, and often 10 to 20 cm long and 1 to 2 cm wide, the sheaths ciliate at the mouth. Spikelets crowded in subglobose, scattered or close heads, on the spike-like branches of the panicle, glabrous, fertile and imperfect ones mixed. Empty glumes 2 or 3, 2 to 4 mm long, 7- to 9-nerved, mucronate. Flowering glumes 5 mm long, 9-nerved, mucronate. Fruit globose, glabrous, about 6 mm in diameter, the glumes persistent.

In ravines opposite Guadalupe, not found in flower here, but flowering near Montalban in July. Known only from Luzon.

14. CYPERACEAE (SEDGE OR BALANGOT FAMILY)

Grass-like plants with usually 3-ranked leaves and solid, cylindric or 3-angled stems, the sheaths closed, sometimes leafless. Flowers perfect or 1-sexual, small, in the axils of the scales (glumes) of the spikes or spikelets, these solitary or in panicles, heads, umbels, racemes, spikes, or fascicles. Perianth none or of hypogynous bristles or scales. Stamens 1 to 3. Ovary 1-celled; style short, or slender and elongated, 2- or 3-cleft. Fruit a small, compressed, 3-angled, cylindric, or globose nut.

Genera about 75, species more than 3,000, in all parts of the world, 25 genera and about 150 species in the Philippines.

1. Spikelets of few or many glumes, the first 1 or 2 always empty, the uppermost male or empty, the intermediate ones with perfect flowers.
    2. Flowering glumes many, distichously arranged.
        3. Style 2-fid.

- 4. Rachilla of spikelet deciduous; spikelets crowded in sessile, globose or ovoid heads........ 1. *Kyllinga*
- 4. Rachilla persistent long after the glumes have fallen.
  - 5. Nut laterally compressed........ 2. *Pycreus*
  - 5. Nut dorsally compressed........ 3. *Juncellus*
- 3. Style 3-fid.
  - 4. Rachilla of spikelet persistent........ 4. *Cyperus*
  - 4. Rachilla deciduous.
    - 5. Rachilla breaking at the lower node only........ 5. *Mariscus*
    - 5. Rachilla breaking up into several 1-seeded joints.. 6. *Torulinium*
- 2. Flowering glumes many, spirally arranged.
  - 3. Style-base constricted or jointed above the nut; leaves all basal or wanting, except the leaf-like floral bracts.
    - 4. Hypogynous bristles present; leaves none........ 7. *Eleocharis*
    - 4. Hypogynous bristles none; leaves usually present.. 8. *Fimbristylis*
  - 3. Style-base passing gradually into the nut.
    - 4. Hypogynous bristles 0 to 6, linear; leaves glabrous........ 9. *Scirpus*
    - 4. Hypogynous bristles 3 or 6, the inner ones broadly obovate; leaves hairy........ 10. *Fuirena*
    - 4. Hypogynous scales 2, enclosing the nut; glumes with spreading tips; inflorescence of a single spikelet........ 11. *Lipocarpha*
- 2. Flowering glumes 1 or 2, with several lower empty ones and several upper empty or male ones; style 2-fid........ 12. *Rynchospora*
- 1. Spikelets 1-sexual or with 1 basal female flower and 1 or more male or empty glumes; nut bony, globose, usually white and shining.
  - 2. Nut smooth, verrucose, tessellated, or tuberculate; glumes entire, 1-nerved........ 13. *Scleria*
  - 2. Nut longitudinally fluted; glumes 3-fid, with 3 to 5 nerves. 14. *Diplacrum*

1. KYLLINGA Rottboell

Erect, tufted or scattered, the stems simple, leafy below only, terminated by 1 to 3 capitate sessile spikes, subtended by about 3, leaf-like, spreading bracts. Spikes ovoid to cylindric, dense. Spikelets numerous, compressed; glumes 4 or 5, distichous, the rachilla breaking above the two lower empty glumes; third glume bearing a perfect flower; fourth male or empty, the fifth rudimentary or none. Nut laterally compressed; style linear, base continuous with the nut, the branches 2, linear. (In honor of P. Kylling, a Danish botanist.)

Species 30 or more in most warm and hot countries, 5 or 6 in the Philippines.

- 1. Heads green; nut-bearing glume not winged along the upper one-half of the keel........ 1. *K. brevifolia*
- 1. Heads white; nut-bearing glume winged along the upper one-half of the keel........ 2. *K. monocephala*

1. K. brevifolia Rottb.

Stems slender, glabrous, 10 to 50 cm high, usually scattered, from slender creeping root-stocks. Leaves narrow, 3 to 10 cm long, less than 3 mm wide, the bracts similar, spreading. Spikes mostly solitary, ovoid, green, 8 mm long or less. Spikelets very numerous, lanceolate, acuminate, about 3 mm long, keel of the flowering glume not winged. Nut about 1 mm long, compressed.

In open grass lands, waste places, etc., fl. most of the year; widely distributed in the Philippines. Most tropical and warm countries.

2. **K. monocephala** Rottb.

A more or less tufted glabrous plant from creeping rootstocks. Stems 10 to 40 cm high. Leaves up to 15 cm in length or longer, 3 to 4 mm wide, the bracts similar. Heads ovoid, simple, white, 8 to 13 mm long. Spikelets very numerous, 3 to 3.5 mm long, the flowering glume distinctly winged along the keel. Nut up to 1.5 mm long.

In open waste places, grass lands, lawns, etc., fl. all the year; throughout the Philippines. All warm and tropical countries.

2. PYCREUS Beauvois

Tufted or scattered, annual or perennial, mostly slender plants, leafy only at the base, the bracts subtending the inflorescence leaf-like. Inflorescence umbellate or subcapitate. Spikelets compressed, linear to oblong, usually numerous; glumes many, arranged in two ranks, imbricate. Nut laterally compressed; style-branches 2.

Species about 50 in all warm and temperate regions, about 5 in the Philippines.

1. Annual, slender; glumes 1.5 mm long.. 1. *P. nitens*
1. Perennial, stouter; glumes 2 mm long.
  2. Spikelets ascending; nut rounded or truncate.................. 2. *P. odoratus*
  2. Spikelets spreading; nut apiculate....................................... 3. *P. eragrostis*

1. **P. nitens** (Vahl) Nees.

A small, slender, erect, tufted annual, 5 to 20 cm high, the leaves slender, narrow, shorter than the stems. Umbels simple or reduced to one head, subtended by few leaf-like bracts. Spikelets usually pale, 5 to 30 in a spike or head, narrowly oblong, 5 to 8 mm long, each composed of from 8 to 30, 1.5 mm long, mucronate glumes. Nut compressed, about 0.6 mm long.

In open grass lands, gardens, etc., fl. Aug.–Jan.; widely distributed in the Philippines. Tropical Asia, Africa, Malaya, and Australia.

2. **P. odoratus** (L.) Urban (*P. polystachyus* Beauv.).

An erect, glabrous, rather slender perennial, the stems 20 to 70 cm high. Leaves mostly shorter than the stems, sometimes equaling them. Umbels simple or reduced to one head, subtended by leaf-like bracts, the rays 1 to 7. Spikes dense, composed of from 10 to 20 ascending spikelets. Spikelets brown, linear, 1 to 1.5 cm long. Glumes oblong, 15 to 30 or more, about 2 mm long, obtuse. Nuts oblong, black, 1 mm long, rounded or truncate.

Var. **paniculatus** (Rottb.) Merr. (*P. polystachyus* var. *laxiflorus* Benth.).

Differing from the species in its lax, open inflorescence which is about 10 cm long, the spikelets also longer.

In open waste places, lawns, etc., common, flowering all the year; throughout the Philippines. All warm regions, especially near the sea.

3. **P. eragrostis** (Vahl) Merr. (*Cyperus eragrostis* Vahl).

Erect, tufted, glabrous, 15 to 50 cm high, the leaves narrow, much shorter than the stems, somewhat flaccid, the involucral bracts leaf-like, long and slender. Umbels simple, the rays 1 to 5, sometimes reduced to a simple head. Spikes globose, the spikelets spreading, fascicled, linear-oblong, brownish, sessile, 1 to 1.5 cm long. Glumes 10 to 50, ovate, obtuse, 2 mm long. Nut ellipsoid, somewhat compressed, apiculate, about 1 mm long.

In open grass lands, La Loma, fl. Nov.–Jan.; of local occurrence in the Philippines. Temperate and tropical parts of the Old World.

JUNCELLUS C. B. Clarke

Stems erect, tufted, leafy only near the base, the inflorescence umbellate or capitate, subtended by leaf-like bracts. Spikelets compressed. Glumes many, in two ranks, imbricate, concave, the first two empty, the others with perfect flowers, the uppermost ones empty. Stamens 3 or 2. Nut plano-convex, broad, the plane face against the rachilla; style-branches 2. (Diminutive of *Juncus*, the Latin name of the rush.)

Species about 12, in all warm countries, 1 in the Philippines.

1. **J. pygmaeus** (Rottb.) C. B. Clarke.

An annual, tufted, glabrous plant, 3 to 20 cm high, the stems usually numerous. Leaves thin, 10 cm long or less, 1 to 2 mm wide. Inflorescence capitate, heads solitary, 1 cm in diameter or less. Spikelets very numerous, about 5 mm long, the glumes about 20, oblong-lanceolate, 2 mm long. Nut oblong-ellipsoid, about 1 mm long.

In open gravelly soil near Culiculi, fl. March–May; of local occurrence in the Philippines. All warm countries.

4. CYPERUS Linnaeus

Coarse or slender, tufted or scattered, erect, annual or perennial plants, the stems leafy only at the base, the bracts leaf-like. Inflorescence umbellate or capitate. Spikelets linear or oblong, compressed, the rachilla persistent. Glumes distichous, the first two empty, the succeeding ones bisexual, seriatim deciduous. Nut 3-angled or plano-convex; style 3-fid. (Ancient Greek name.)

More than 300 species in all warm countries, about 21 in the Philippines.

1. Spikelets digitate or clustered, not spicate or racemose.
  2. Low slender annuals, the leaves less than 5 mm wide.
    3. Nuts about as long as the glumes.................................... 1. *C. difformis*
    3. Nuts very much shorter than the glumes.............................. 2. *C. haspan*
  2. Perennials, the leaves or bracts 5 to 20 mm in width.
    3. Coarse, erect, leafless at the base; cultivated only. 3. *C. flabelliformis*
    3. Basal leaves numerous, equaling or longer than the stems. 4. *C. diffusus*
1. Spikelets spicately or subracemosely arranged.
  2. Rachilla of spikelets not at all or obscurely winged.
    3. Tufted annuals; mostly slender plants.
      4. Spikelets 3 to 10 mm long; glumes about 1.2 mm long, obovate, the nuts as long as the glumes.................................... 5. *C. iria*
      4. Spikelets 10 to 30 mm long; glumes about 3.5 mm long, prominently acuminate, much longer than the nuts.... 6. *C. compressus*
    3. Perennials with woody rootstocks and often long stolons; coarse plants.
      4. Rachis of the spikes pubescent; spikelets 5 to 10 mm long, compressed.................................... 7. *C. pilosus*

4. Rachis glabrous.
    5. Leaves very short, less than 5 cm long; spikelets crowded. 8. *C. malaccensis*
    5. Leaves long, sometimes equaling the stem; spikelets laxly disposed .... 9. *C. distans*

2. Rachilla of spikelets distinctly winged.
  3. Slender plants less than 0.5 m high.
    4. Spikes mostly dense, of from 3 to 8 spikelets; roots with thickened, ovoid or globose tubers .... 10. *C. rotundus*
    4. Spikes lax, of from 2 to 6 spikelets; glumes rather distant. 11. *C. zollingeri*
  3. Coarse plants often 1 m high; spikes 3 to 6 at the end of each branch of the inflorescence, densely many-flowered. 12. *C. radiatus*

1. **C. difformis** L.

A tufted glabrous annual 10 to 40 cm long, the stems sharply 3-angled at the top. Leaves rather flaccid, somewhat shorter than the stems, 2 to 3 mm wide. Inflorescence umbellate, simple or compound, subtended by two leaf-like bracts, contracted or spreading, the rays 1 to 5 cm long, some sessile, some long-peduncled. Spikelets very numerous, 2 to 5 mm long, crowded in globose or ovoid masses on the ends of the branches, each spikelet with from 8 to 25 flowers, the flowering glumes about 0.6 mm long, obtuse, brownish. Nutlets about 0.6 mm long.

In open wet grass lands, fl. all the year; throughout the Philippines. A characteristic rice-paddy weed throughout the warmer parts of the Old World, introduced in Mexico.

2. **C. haspan** L.

A tufted, glabrous, rather flaccid plant 10 to 40 cm high. Leaves often as long as the stem, sometimes shorter, or nearly wanting, 3 to 5 mm wide. Inflorescence umbellate, simple or compound, of few or many crowded or spreading rays, each with few to many spikelets, dense or lax. Spikelets brown, 3 to 10 mm long, 8- to 25-flowered, the glumes about 1.2 mm long, imbricate, obtuse. Nutlets 3-angled, about 0.4 mm long.

In open, wet, grass lands, especially rice-paddies, fl. all the year; throughout the Philippines. All warm countries; a characteristic rice-paddy weed.

*3. C. FLABELLIFORMIS Rottb. Umbrella Plant.

A stout, erect, tufted plant reaching a height of 1.5 m, the stems up to 1 cm in diameter, base covered with leafless sheaths. Leaves all crowded in a dense, spirally arranged whorl at the ends of the stems, spreading, numerous, up to 30 cm long, 0.5 to 2 cm wide, acuminate. Umbels in the leaf-axils, numerous, 8 cm wide or less, their peduncles slender, 10 cm long or less. Spikelets sessile, in peduncled and sessile heads, oblong, up to 1 cm long, the glumes 20 to 30, about 2 mm long. Nuts 0.8 mm long.

Frequently cultivated, but not spontaneous, fl. Dec.–March. A native of Arabia and Abyssinia, now cultivated in many warm countries.

4. **C. diffusus** Vahl.

An erect glabrous perennial 30 to 60 cm high, the leaves basal, flat, broad, numerous, crowded, equaling or longer than the stems, 3-nerved, 8 to 15 mm wide, the root-stock short. Stems 3-angled, the bracts subtending the inflorescence leaf-like, 10 to 50 cm long, broad, spreading. Umbels 8 to 20 cm in diameter, decompound, rather lax. Spikelets 3 or more together at the ends of the branchlets, 3 to 10 mm long, green, brownish, or purplish, 3- to 10-flowered or more. Glumes ovate, mucronate, 3- to 5-nerved about 1.8 mm long. Nut oblong or ellipsoid, 1.5 mm long, 3-angled.

In shaded ravines, San Francisco del Monte, fl. Aug.–Feb.; widely distributed in the Philippines. All tropical regions.

5. **C. iria** L.

A tufted glabrous annual 10 to 70 cm high, the leaves long or short, 2 to 5 mm wide. Umbels 3 to 30 cm in diameter, the rays few to many, long or short. Spikes loosely spicate, the spikelets numerous, lax or somewhat crowded, yellow or brown, 3 to 10 mm long, the glumes 6 to 20, obovate, hardly imbricate, about 1.2 mm long, 3- to 5-angled, oblong-obovoid, as long as the glumes.

In open wet grass lands, fl. all the year; throughout the Philippines. Warmer parts of the Old World; a characteristic rice-paddy weed.

6. **C. compressus** L.

A glabrous, green, densely tufted plant, 15 to 50 cm high, the leaves often nearly as long as the stems, sometimes much shorter, 2 to 4 mm broad. Rays of the inflorescence up to 8 cm long, spreading, the bracts often long, leaf-like. Spikes of from 3 to 10 crowded spikelets. Spikelets usually greenish, 1 to 3 cm long, compressed, 10- to 50-flowered flowering glumes about 3.5 mm long, prominently acuminate, densely imbricate. Nuts obovoid, sharply 3-angled, concave on the faces, about 1.5 mm long.

In open grass lands, Masambong, San Pedro Macati, Pasay, etc., fl. July–Jan.; throughout the Philippines. Tropics generally.

7. **C. pilosus** Vahl.

A somewhat stout, erect, loosely tufted plant, 0.4 to 0.8 m high, glabrous except the pubescent rachis of the spikes. Leaves often three-fourths as long as the stem, 4 to 7 mm wide, the bracts longer than the umbellate inflorescence, leaf-like. Inflorescence 6 to 20 cm in diameter, compound, the rays long and short. Spikelets 5 to 10 mm long, narrow, compressed, spreading when ripe, the glumes 8 to 20, about 1.8 mm long, close or remote, ovate, pointed. Nut acutely 3-angled, ovoid, acute, about 1 mm long.

In open grass lands, fl. all the year; widely distributed in the Philippines. Tropical Asia and Africa through Malaya to Australia.

8. **C. malaccensis** Lam. Balangot (Tag.).

A tall, coarse, glabrous perennial from creeping rhizomes, the stems 0.5 to 1.5 m high, stout, sharply 3-angled, almost 3-winged at the top. Leaves few or none, 3 cm long or less, the 2 to 5 bracts subtending the inflorescence leaf-like, up to 20 cm long. Umbels 5 to 15 cm in diameter, usually congested. Spikelets somewhat crowded, linear, 1 to 2 cm long, the glumes 15 to 30, oblong, obtuse, about 2 mm long. Nut narrowly oblong, about 1.7 mm long.

In brackish swamps, etc., fl. July–Dec.; throughout the Philippines along tidal streams. Tropical Africa and Asia through Malaya to Polynesia and Australia.

9. **C. distans** L.

A rather stout, erect, scarcely tufted, glabrous, stoloniferous perennial 0.4 to 1 m high, the stems triangular, covered with sheaths below. Leaves often as long as the stem, 4 to 6 mm wide. Umbels diffuse, compound, 10 to 30 cm in diameter, the rays long and short, up to 20 cm in length, slender. Spikelets red or reddish-brown, spreading, slender, rather laxly disposed, 1 to 3 cm long, 10- to 25-flowered, the glumes obtuse, oblong-elliptic, remote, 2 mm long. Nut oblong, 1.3 to 1.5 mm long.

In open grass lands, San Juan del Monte and other places, fl. all the year; throughout the Philippines. Tropics generally.

10. **C. rotundus** L. Mutha (Tag.).

A slender, erect, glabrous perennial 10 to 40 cm high, the rhizomes wiry, bearing black, hard, ovoid tubers about 1 cm in diameter. Stems usually solitary, 3-angled above. Leaves 5 to 15 cm long, or sometimes as long as the stems, 3 mm wide or less. Umbel simple or compound, 2 to 6 cm long, the rays long or short, the spikes dense or rather lax, of from 3 to 8 spikelets. Spikelets brown, slender, 10 to 25 mm long, 10- to 25-flowered, the glumes 2.5 to 3 mm long.

In gardens, lawns, waste places, etc., very common, fl. all the year; throughout the Philippines. In all warm countries.

11. **C. zollingeri** Steud.

A slender glabrous perennial 10 to 50 cm high, the stems mostly solitary. Leaves 5 to 20 cm long, 2 mm wide or less. Umbels simple or compound, rather lax, of few long and short rays, sometimes reduced to one, the spikes rather lax, of from 2 to 6 spikelets. Spikelets brown, slender, 1 to 2.5 cm long, 10- to 15-flowered, the glumes about 3 mm long, rather distant. Nut 3-angled, 2 mm long.

In open, dry grass lands, Masambong, fl. July–Sept.; not common in the Philippines. Tropical Asia and Africa, through Malaya to Australia.

12. **C. radiatus** Vahl.

A coarse, erect, tufted perennial 0.2 to 1 m high. Leaves one-half to two-thirds as long as the stems, 7 mm wide or less, the bracts subtending the inflorescence leaf-like. Inflorescence compound, umbellate, brown, the rays long or short. Spikes 3 to 6 at the end of each branch, sessile, dense, cylindric, 1.5 to 4 cm long, 6 to 8 mm thick. Spikelets 4 to 5 mm long, 12- to 18-flowered, the glumes about 1.2 mm long. Nut ovoid, about 0.9 mm long.

In open wet lands and swampy places, common, fl. all the year; throughout the Philippines. Widely distributed in the tropics.

5. MARISCUS Gaertner

Coarse or slender tufted plants, usually perennials, rarely annuals. Leaves mostly basal, sometimes cauline, the bracts leaf-like. Inflorescence of umbelled heads or spikes. Spikelets more or less compressed; glumes distichous, the rachilla of the spikelet disarticulating above the 2 lowest glumes. Nut trigonous; style 3-fid.

Species about 160 in all warm regions, about 8 in the Philippines. A genus very closely allied to *Cyperus*, differing chiefly in the articulated rachillas.

1. Umbels simple.
    2. Spikes cylindric, dense, about 2 cm long; spikelets usually 2-flowered. 1. *M. cyperinus*
    2. Spikes linear, lax .... 2. *M. flabelliformis*

1. Umbels compound.
    2. Spikelets oblong, turgid, 7 mm long or less, arranged in spikes; a coarse, glaucous plant.. 3. *M. stuppeus*
    2. Spikelets linear or linear-lanceolate, 8 to 15 mm long, in dense globose heads at the ends of the branches.. 4. *M. dilatus*

1. **M. cyperinus** (Retz.) Vahl.

A glabrous, erect, tufted plant 20 to 60 cm high, the inflorescence umbellate. Leaves 15 to 30 cm long, 4 to 8 mm wide, the bracts subtending the inflorescence similar to the leaves. Spikes 5 to 10, cylindric, dense, about 2 cm long. Spikelets lanceolate, 4 to 5 mm long, green or brownish-green, straight, each with about 2 flowers, the nutlets oblong, 2 mm long.

In thickets, Masambong, fl. Aug.–Oct.; throughout the Philippines. Tropical Asia through Malaya to Polynesia.

2. **M. flabelliformis** HBK.

A slender, erect, tufted plant 25 to 40 cm tall. Leaves 20 to 30 cm long, 2 to 3 mm wide, the bracts similar. Inflorescence umbellate, the rays usually about 5, 2 to 5 cm long. Spikes 1.5 to 2 cm long, rather lax, green. Spikelets ascending, slender, about 1 cm long, the glumes about 5, distant, about 3.5 mm long. Nutlets oblong, 2 mm long.

In shady thickets, Masambong, fl. Aug.–Oct.; rather widely distributed in the Philippines. Most tropical countries.

3. **M. stuppeus** (Forst.) Merr. (*M. albescens* Gaudich.).

A coarse, erect, tufted perennial 50 to 80 cm high, pale-green or glaucous. Leaves rather thick, stiff, nearly as long as the stem, 4 to 6 mm wide, often complanate, the bracts similar. Inflorescence umbellate, 6 to 15 cm in diameter, the spikes dense, 1.5 to 3 cm long, about 1 cm in diameter, brown. Spikelets spreading, 5 to 7 mm long, the glumes obtuse, 5 to 9, 2 to 3 mm long. Nutlets ovoid, dark-brown, 1 to 1.2 mm long.

In open wet lands near the sea, fl. all the year; throughout the Philippines near the seashore. Tropical Asia and Africa through Malaya to Australia and Polynesia.

4. **M. dilutus** (Vahl) Nees (*M. microcephalus* Presl).

A coarse, erect, loosely tufted, glabrous plant 4 to 80 cm high. Leaves and bracts somewhat spongy, the former often nearly as long as the stem, 8 mm wide or less. Inflorescence 10 to 25 cm in diameter, compound, the spikes radiately globose at the ends of the branchlets, each composed of very numerous, linear or linear-lanceolate, brown, straight spikelets 0.8 to 1.5 cm long. Glumes 6 to 14, obtuse, somewhat distant, 3 to 4 mm long. Nutlet oblong, beaked, 2 mm long.

In open wet lands, fl. all the year; throughout the Philippines. India to Mauritius, China, and Malaya.

6. **TORULINIUM** Desvaux

Similar to *Mariscus* and *Cyperus*, but the spikelets breaking up into several joints, each containing 1 nut.

A genus consisting of a single variable species found in all warm regions.

1. **T. ferax** (Rich.) Ham. (*T. confertum* Desv.).

A rather coarse, erect, glabrous plant 0.2 to 1 m high, scarcely tufted, the stems 3-angled. Leaves few, 1 cm wide or less, the bracts subtending the inflorescence spreading, few to many, leaf-like. Umbels usually compound, 10 to 25 cm in diameter. Spikes 2 to 5 cm long, bearing very numerous, spreading, slender spikelets. Spikelets usually about 1 cm long, yellow or brown, the glumes 6 to 10, rather distant, elliptic, about 7-nerved, the rachilla flexuose, breaking up into joints, each bearing one glume and nut. Nut oblong, about 1.8 mm long.

In open wet places, occasional, fl. Nov.–Jan.; widely distributed in the Philippines. All warm regions.

7. ELEOCHARIS R. Brown

Glabrous, erect, tufted plants, the stems simple, without nodes. Leaves none; sheaths few, cylindric, truncate or with a small tooth. Inflorescence a single terminal spikelet. Glumes imbricate all around. Hypogynous bristles 5 to 8. Nut obovoid, plano-convex or 3-angled; style-base constricted and apparently articulated on the nut but usually persistent; arms 2 or 3. (From the Greek "marsh" and "grace.")

More than 100 species, in all parts of the world, 8 or 9 in the Philippines.

1. Spikelets elongated, 1 cm long or more.
    2. Nuts smooth .... 1. *E. equisetina*
    2. Nuts longitudinally rugose .... 2. *E. variegata*
1. Spikelets globose or ovoid, 5 mm long or less .... 3. *E. capitata*

1. **E. equisetina** Presl.

A somewhat slender tufted plant, the stems sometimes nearly 1 m high, usually much shorter, about 3 mm in diameter, transversely septate when dry, the uppermost sheath close-fitting, continued on one side as a short triangular tooth. Spikelet 1 to 3 cm long, scarcely thicker than the stem. Glumes broadly oblong-ovoid, rounded. Nut smooth and shining, ellipsoid or obovoid, 2 mm long.

In open wet lands, swampy places, etc., fl. Oct.–Dec., and probably in other months; of local occurrence in the Philippines. Ceylon to New Caledonia.

2. **E. variegata** Kunth, var. **laxiflora** (Thw.) C. B. Clarke.

A rather slender tufted plant 10 to 30 cm high, the stems about 1.5 mm in diameter. Sheaths close-fitting. Spikelet only a little thicker than the stem, 1.5 to 2.5 cm long. Glumes oblong-ovate, acute or acuminate, 4 mm long. Nuts brown, obovoid, nearly 2 mm long, longitudinally rugose, the hypogynous bristles longer than the nut, retrorsely scabrid.

In old rice-paddies near Caloocan, fl. Dec.–Feb.; of local occurrence in the Philippines. India to China, Malaya, and Polynesia.

3. **E. capitata** (L.) R. Br.

Stems slender, densely tufted, erect, rather stiff, often purplish at the base, 10 to 30 cm long. Spikelets small, dense, ovoid, 4 to 5 mm long. Glumes ovate, obtuse, thin, 2 mm long. Nut black, shining, obovoid, about 1 mm long, the bristles as long as the nut, retrorsely scabrid.

In open wet grass lands especially near the sea, fl. most of the year; widely distributed in the Philippines. Most warm countries.

8. FIMBRISTYLIS Vahl

Tufted plants from fibrous roots. Leaves all basal, short or long. Inflorescence terminal, umbellate, simple or compound, or reduced to a single spikelet. Spikelets solitary or clustered, sessile or pedicelled, many-flowered. Glumes spirally arranged, imbricate, or the lower ones 2-ranked. Hypogynous bristles none. Style usually long, villous, 2- or 3-fid. Nut obovoid, rarely oblong, usually compressed and biconvex, smooth, striate, or rugose. (From the Latin "fringe" and "style.")

A large genus with 125 or more species, about 25 in the Philippines.

1. Glumes all spirally arranged.
  2. Stems with only one spikelet.
    3. Nut linear-oblong .... 1. *F. tetragona*
    3. Nut obovoid.
      4. Nut transversely wavy-wrinkled .... 2. *F. acuminata*
      4. Nut smooth .... 3. *F. polytrichoides*
  2. Stems with few to many spikelets.
    3. Style 2-fid.
      4. Spikelets few, 2 to 5.
        5. Spikelets 1 to 1.5 cm long .... 4. *F. schoenoides*
        5. Spikelets less than 1 cm long .... 5. *F. corniculata*
      4. Spikelets numerous.
        5. Nut cylindric; glumes long-acuminate, the tips spreading. 6. *F. dipsacea*
        5. Nut obovoid; glumes obtuse or acute.
          6. Nut longitudinally striate; leaves many, mostly long. 7. *F. diphylla*
          6. Nut smooth or nearly so; leaves usually short, often wanting. 8. *F. ferruginea*
    3. Style 3-fid.
      4. Spikelets crowded in globose, solitary heads .... 9. *F. barbata*
      4. Spikelets in open decompound umbels .... 10. *F. miliacea*
1. Lower glumes distichous, the upper ones spiral; spikelets 1 or 2 on each stem .... 11. *F. monostachya*

1. F. tetragona R. Br.

A slender, tufted, leafless or nearly leafless annual plant 10 to 45 cm high, the stems somewhat 4-angled. Spikelets erect, solitary, terminal, ovoid-conic, 7 to 14 mm long, densely flowered. Glumes oblong, obtuse, 3 to 3.5 mm long. Nut linear-oblong, 2 mm long, reticulate, somewhat curved; style villous, the arms 3 or 2.

In open wet grass lands, La Loma, rare, fl. Nov.–Jan.; of local occurrence in the Philippines. India to Australia.

2. F. acuminata Vahl.

A slender, tufted, somewhat wiry leafless plant, the stems nearly terete, 10 to 25 cm high. Spikelets solitary, terminal, 8 to 12 mm long, lanceolate, acuminate. Glumes ovate, usually brown or purplish with a green keel, about 5 mm long, acute. Nut obovoid, compressed, about 2 mm long, transversely wavy-wrinkled. Style 2-cleft.

In open wet grass lands, Novaliches road; widely distributed in the Philippines. Tropical Asia through Malaya to Australia.

3. F. polytrichoides (Retz.) Vahl.

A rather slender, glabrous, densely tufted plant 10 to 20 cm high. Leaves slender, one-half as long as, or equaling, the stems. Spikelets terminal, solitary, oblong-ovoid, 5 to 8 mm long, brownish. Glumes numerous, all spirally arranged, oblong-ovate, obtuse, about 3 mm long. Nut obovoid, obtuse, compressed, brown, smooth, 1 mm long. Style-arms 2.

In open lands, especially near the sea or within the influence of salt water, fl. all the year; widely distributed in the Philippines. Tropics of the Old World.

4. **F. schoenoides** (Retz.) Vahl.

A tufted, slender, glabrous plant 15 to 50 cm high, the leaves basal, numerous, usually much shorter than the stems, filiform. Spikelets few, 2 to 5 on each stem, peduncled, ovoid to oblong-ovoid, pale or brown, 1 to 1.5 cm long. Glumes broadly ovate, all spirally arranged, obtuse or slightly mucronate, striate, about 4 mm long, all caducous from the base of the spikelet upward. Nut obovoid, somewhat compressed, shining, stalked, brownish, smooth, 1.5 to 2 mm long. Style-arms 2.

In open grass lands, San Pedro Macati, fl. Nov.–Feb.; widely distributed in the Philippines. India to China, Malaya, and Australia.

5. **F. corniculata** Merr.

A slender, tufted, annual plant, quite glabrous, the basal leaves few, linear, 5 to 8 mm long, the leaves reduced to basal sheaths. Spikelets brown, few, 3 to 8 mm long, 3 to 5 in a simple umbel, the central one sessile. Glumes 15 or less, brown, ciliate on the margins, retuse or rounded, the keel prominent, excurrent as a stout awn. Nut obovoid, 0.5 mm long, verruculose, black; style 3-fid.

In open grass lands, La Loma, fl. Nov.–Dec.; known only from this locality.

6. **F. dipsacea** (Rottb.) Benth.

A slender, tufted, glabrous annual 8 to 20 cm high. Leaves short or sometimes as long as the stems, capillary. Umbels simple or sometimes compound mostly under 2 cm in diameter, of 2 or 3 to 8 or 10 spikelets, the bracts filiform. Spikelets ovoid, dense, 3 to 5 mm long, the glumes aristate, tips spreading. Nuts cylindric-oblong, brown, 0.5 mm long. Style-arms 2.

On sandy mudbanks along the river near Pasig, fl. Feb.–Apr.; widely distributed in the Philippines. Tropical Asia and Africa to Malaya.

7. **F. diphylla** (Retz.) Vahl.

An exceedingly variable, tufted, glabrous or somewhat pubescent plant 30 to 50 cm high. Leaves linear to filiform, basal, numerous, 10 to 30 cm long, 1 to 3 mm wide. Umbels simple or compound, 3 to 7 cm long. Spikelets pedicelled or some sessile, brown, ovoid, 6 to 8 mm long. Glumes numerous, all spirally arranged, imbricate. Nut oblong-ovoid to obovate, 1 to 1.2 mm long, distinctly longitudinally striate.

Common in open grass lands, etc., fl. all the year, exceedingly variable; throughout the Philippines. All warm countries.

8. **F. ferruginea** (L.) Vahl.

A densely tufted, usually glabrous, sometimes slightly pubescent plant, the stems rather stiff, slender, 30 to 60 cm high. Leaves narrow, erect, stiff, striate, short, or sometimes none, the sheaths only present. Umbels simple or compound, usually contracted, 5 to 7 cm long. Spikelets brown, 5 to 20, all pedicelled or some sessile, about 1 cm long. Glumes very numerous, ovate, 3 mm long, obtuse. Nuts obovoid, usually pale, or brownish, compressed, smooth, about 1.2 mm long. Style villous below, arms 2.

In open places especially near the sea, fl. all the year; in maritime districts throughout the Philippines. All warm regions.

9. [**F. barbata** (Rottb.) Benth.] (valid *Bulbostylis barbata* Kunth).

A very slender, densely tufted annual 5 to 25 cm high. Leaves numerous, filiform, much shorter than the stems, the sheaths with few to many long white hairs. Spikelets few to many, brownish, about 3 mm long, crowded in dense, globose, solitary heads 3 to 7 mm in diameter, each head subtended by usually two filiform leaves, one much longer than the other.

In open, dry grass lands, railroad grades, etc., fl. Aug.–Jan.; throughout the Philippines. Warmer parts of the world.

10. **F. miliacea** (L.) Vahl.

A tufted, slender, glabrous, rather flaccid annual 40 to 60 cm high, the leaves basal, distichous, up to 40 cm in length. Umbels decompound, rather lax and diffuse, 6 to 10 cm long. Spikelets small, obtuse, globose, 2 to 2.5 mm long, pale or brown, mostly slenderly pedicelled, some sessile. Nuts obovoid, 0.5 mm long. Style 3-fid.

In open wet grass lands, old rice fields etc., common, fl. throughout the year; widely distributed in the Philippines. All warm countries.

11. **F. monostachya** (L.) Hassk.

A tufted glabrous plant, the stems slender, leafy at the base, 10 to 40 cm high. Leaves usually as long as the stem, filiform. Spikelet terminal, usually solitary, ovoid, 5 to 10 mm long or more, the lower glumes distichous, the upper ones spiral, ovate, acuminate, 4 mm long, the keel green, the sides shining, straw-colored. Nut obovoid, pale, 2 mm long, tuberculate.

In open grass lands, San Pedro Macati, fl. July–Sept.; widely distributed in the Philippines. All warm regions.

9. SCIRPUS Linnaeus

Tufted or scattered, glabrous. Stems slender or coarse, 3-angled or terete. Spikelets many-flowered, in terminal corymbs or in lateral heads, the latter sometimes reduced to single spikelets. Hypogynous bristles present or wanting. Style 2- or 3-fid. Nut 3-angled or plano-convex. (Latin name for the rush.)

Species about 125 in all parts of the world, about 8 in the Philippines.

1. Inflorescence a terminal corymb; coarse plants 1.5 to 2 m high with 3-angled stems........ 1. *S. grossus*
1. Inflorescence lateral, capitate or reduced to few or 1 spikelets.
    2. Stems 3-angled........ 2. *S. mucronatus*
    2. Stems terete.
        3. Heads of the lower part of the stems........ 3. *S. articulatus*
        3. Heads on the upper part of the stems.
            4. Hypogynous bristles none........ 4. *S. supinus*
            4. Hypogynous bristles present........ 5. *S. erectus*

1. **S. grossus** L. f.

A very coarse, erect, glabrous perennial, the stems triangular 1.5 to 2 m high, the leaves basal, often half as long as the stem, 1 to 2 cm wide, the leaf-like bracts subtending the inflorescence, spreading, broad, 30 to 60 cm long. Inflorescence corymbose, 10 to 18 cm long. Spikelets very numerous, brown, ovoid, 5 to 8 mm long.

In open fresh water swamps, along streams etc., fl. May–Nov.; widely distributed in the Philippines. India to Malaya.

2. **S. articulatus** L.

A densely tufted plant 20 to 50 cm high, the stems rather spongy, terete, leafless, when dry often transversely septate. Spikelets ovoid to oblong, 1 cm long or less, 7 to 30 in a dense, globose, lateral head near the base of the stems. Glumes ovate, about 4 mm long. Nuts 3-angled, black and shining, obovoid, about 2 mm long. Hypogynous bristles none.

In open wet places, fl. Oct.–Apr.; widely distributed in the Philippines. Tropical Asia, Africa, and Australia.

3. **S. mucronatus** L.

A tufted rather coarse plant, the stems 3-angled, 40 to 80 cm high, leafless or nearly so, produced beyond the inflorescence 2 to 9 cm, sharp, the sheaths basal. Spikelets in a single, lateral, dense head, ovoid to oblong, 6 to 15 mm long, 5 to 20 in each head. Glumes numerous, ovate, acute, about 4 mm long. Nut obovoid, somewhat compressed, about 2 mm long, smooth and shining; style 3-fid. Hypogynous bristles 5 or 6, retrorsely scabrous.

In open wet places, fl. all the year; widely distributed in the Philippines. Europe to Madagascar, Asia, Malaya, and Australia.

4. **S. supinus** L.

A slender tufted plant 10 to 30 cm high, the leaves all basal, few, 1 cm long or less or reduced to sheaths. Stems terete, produced 3 to 10 cm above the inflorescence. Spikelets 3 to 7 in a single lateral head, ovoid to oblong, 4 to 7 mm long. Glumes numerous, ovate, acuminate, 2 to 2.5 mm long. Nuts brown or black, 1.2 mm long, shining, slightly transversely rugose, 3-angled and somewhat compressed. Hypogynous bristles none.

In old rice-paddies and open wet places, Caloocan, fl. Oct.–March; widely distributed in the Philippines. Tropics generally.

5. **S. erectus** Poir.

A rather slender tufted plant 20 to 60 cm high, the leaves few, short, basal, or wanting, the stems terete, produced beyond the inflorescence 2 to 10 cm. Spikelets solitary or more often 2 to 5 in a lateral head, ovoid to oblong, 1 cm long or less. Glumes ovate, concave, about 3.5 mm long. Nut obovoid, black or brown, shining, somewhat compressed, 2 mm long. Hypogynous bristles 5 or 6, about as long as the nut.

In open grass lands, San Pedro Macati, fl. more or less all the year; widely distributed in the Philippines. Temperate and tropical regions generally.

10. FUIRENA Rottboell

Tufted, the stems bearing leaves or leaf-like bracts even in the upper half. Leaves grass-like, base sheathing. Spikelets clustered. Glumes imbricate on all sides, strongly aristate, hairy on the upper one-half. Hypogynous bristles 6, often much reduced, or none. Sepals 3, bristle-like. Petals and stamens 3. Style long, glabrous, slender, 3-cleft. Nut small, ovoid or obovoid, 3-angled, often stalked, smooth or reticulate. (In honor of G. Fuiren, a Danish physician and botanist.)

Species about 25 in all warm regions, 2 in the Philippines.

1. **F. ciliaris** (L.) Roxb. (*F. glomerata* Lam.).

An annual, tufted, rather flaccid, usually hairy plant 15 to 40 cm high. Leaves scattered along the stems, 5 to 15 cm long, 4 to 7 mm wide. Clusters of spikelets 1 to 3 on each stem, rather dense, 1.5 to 2 cm in diameter, each composed of from 3 to 12, 5 to 10 mm long spikelets. Glumes very numerous, oblong-ovate, with a terminal, aristate, straight, hairy, 1.5 to 2 mm long awn. Petals clawed. Nutlet brown, 3-angled, smooth, about 1 mm long.

Abundant in old rice-paddies, Caloocan, San Pedro Macati, etc., fl. Oct.–Jan.; throughout the Philippines. Tropical Asia and Africa, through Malaya to Australia.

11. LIPOCARPHA R. Brown

Glabrous, erect, tufted plants, the stems leafy only near the base, bearing a single head of few spikelets, the perfect flowers numerous. Glumes spirally arranged, deciduous, leaving the persistent rachilla marked with lozenge-shaped scars. Hypogynous bristles represented by 2 elliptic scales as long as the nut, style short, 2- or 3-fid. Nut small, oblong or ovoid, plano-convex, smooth, reticulate. (Greek "fat" and "chaff," in reference to the thick glumes of some species.)

Species about 13, of wide distribution, 2 in the Philippines.

1. **L. microcephala** (R. Br.) Kunth.

A slender, erect, tufted annual 10 to 40 cm high. Leaves narrow, slender, 2 to 10 cm long. Spikelets 1 to 4 at the ends of the stem, subtended by 2, slender, leaf-like unequal bracts. Spikelets ovoid, 3 to 5 mm long, the glumes linear-lanceolate, very numerous, 2 mm long, the tips long-acuminate, spreading. Nut linear-oblong, about 1.2 mm long.

In open places, Malabon, Pasay, fl. Sept.–Dec.; of local occurrence in the Philippines. Southeastern Asia to Australia.

12. RYNCHOSPORA Vahl

Tufted or scattered erect plants with long narrow leaves. Spikelets in one or more heads, or panicled. Glumes often 7 or 8, the lower ones distichous, the upper spiral, the lower 3 or more empty, the next usually longer and containing a perfect flower, the next also nut-bearing, the upper ones male or sterile. Hypogynous bristles often present. Style dilated at the base, long, 2-fid, arms long or short. Nut oblong or ovoid, compressed, the style-base persistent. (Greek "beak" and "seed.")

Species about 150, most numerous in tropical America, about 3 in the Philippines.

1. **R. rubra** (Lour.) Makino (*R. wallichiana* Kunth).

A tufted, erect, rather slender, wiry, glabrous plant, the stems 20 to 60 cm high. Leaves mostly near the base, rather numerous, 10 to 30 cm long, about 2.5 mm wide. Heads solitary, dense, terminal, subglobose, 1 to 1.5 cm in diameter, each subtended by several, short, leaf-like bracts and containing from 20 to 50 spikelets. Glumes 6 or 7, brown. Nut ovoid, about 2 mm long.

In open grass lands, Caloocan, fl. Aug.–Dec.; widely distributed in the Philippines. India to Japan, Malaya, and Australia.

13. SCLERIA Bergius

Annual or perennial, usually tufted, the stems erect, leafy. Leaves narrow, often minutely toothed, sheathing at the base. Panicle often stout, elongated, compound, sometimes narrow, the primary bracts leaf-like, the secondary ones often setaceous. Flowers all unisexual, usually both male and female in the same spikelets, one female below and few males above, usually 2 to 4 empty glumes below the flowering ones. Stamens 1 to 3. Nut bony, often shining, smooth or variously roughened, globose or ovoid, the gynophore usually prominent under the nut. (From the Greek "hard," alluding to the hardened seeds.)

Species 150 or more in most warm countries, about 15 in the Philippines.

1. Nut smooth; slender plants less than 60 cm high.
  2. Rootstocks stout, woody; spikelets 3 to 4 mm long, few. 1. *S. lithosperma*
  2. Roots fibrous; spikelets 4 to 5 mm long.............................. 2. *S. zeylanica*

1. Nut rugose.
  2. Slender, hairy or smooth; nuts tesselate, the raised reticulations with short hairs.. 3. *S. tessellata*
  2. Coarse, scabrid; nuts rugose, glabrous........................... 4. *S. scrobiculata*

1. **S. lithosperma** (L.) Sw.

A rather slender, laxly tufted plant, or the stems scattered, from woody rootstocks, glabrous or the sheaths somewhat pubescent, 15 to 60 cm high. Leaves 2 to 20 cm long, 2 to 3 mm wide. Panicles thin, rather lax, narrow, 5 to 15 cm long, the branches few, distant. Spikelets few, more or less clustered, 3 to 4 mm long. Nut hard, white, shining, smooth, 2.5 mm long, ellipsoid, slightly 3-angled at base and apex.

In dry thickets, Masambong, fl. July–Nov.; widely distributed in the Philippines. Tropics generally, except Africa.

2. **S. zeylanica** Poir.

A rather slender, glabrous or somewhat hairy plant, tufted or the stems scattered, 20 to 40 cm high, from fibrous roots. Leaves 5 to 20 cm long, about 2.5 mm wide. Panicles axillary, distant, small, or reduced to spikes, 1 to 2.5 cm long. Spikelets 4 to 5 mm long, the glumes prominently acuminate. Nut ovoid, white, usually shining, smooth or obscurely rugose, about 2 mm long.

In open wet grass lands, old rice-paddies etc., Caloocan to San Pedro Macati, fl. Sept.–Jan.; widely distributed in the Philippines. India and Ceylon to Malaya.

3. **S. tessellata** Willd. Catabad (Tag.).

Erect, slender, loosely tufted, from fibrous roots somewhat hairy or glabrous, 30 to 60 cm high. Leaves linear, 10 to 20 cm long, scattered. Inflorescence interrupted, the partial panicles 5 to 7 cm long, few-flowered. Spikelets 3 to 4 mm long, the glumes caudate-acuminate. Nut white, subglobose, about 2 mm in diameter, prominently tessellate, the margins of the raised reticulations pubescent with short pale or brownish hairs.

In old rice lands and similar places, occasional, fl. Aug.–Jan.; of wide distribution in the Philippines. India to Japan southward to Australia.

4. **S. scrobiculata** Nees.

A stout, loosely tufted, glabrous perennial, the stems up to 1.5 m in height, scabrid on the angles. Leaves numerous, 12 to 30 cm long, about 1 cm wide, sometimes narrower, margins scabrous, the upper ones falsely opposite or ternate, the sheaths triangular, scabrid. Panicles 15 to 20 cm long, the partial ones 5 to 10 cm long, spreading or ascending. Spikelets brownish-purple, numerous, about 5 mm long, scattered or slightly clustered. Nut white, globose, rugose, 2.5 to 3 mm in diameter.

In thickets, La Loma, fl. most of the year; widely distributed in the Philippines. Malay Peninsula to New Guinea.

14. DIPLACRUM R. Brown

A small, tufted, glabrous annual with leafy stems, the leaves linear. Spikelets in small, dense, axillary clusters at the mouths of the leaf-sheaths, small, unisexual. Male spikelets 1- or 2-flowered, the glumes about 3, narrow, thin. Female spikelets 1-flowered, the glumes distichous, the lower ones boat-shaped, empty, the upper oblong, 3-lobed, many-veined, the middle lobe stout, the lateral one short, incurved. Nut smooth, white, fluted longitudinally; style slender; stigmas 3.

A monotypic genus.

1. **D. caricinum** R. Br. (*Scleria caricina* Benth.).

A slender tufted plant 5 to 15 cm high, glabrous or nearly so. Leaves 1 to 4 cm long, acute, narrow. Heads sessile, axillary, less than 5 mm in diameter. Female spikelets 3 to 4 mm long, the nut globose, about 1 mm in diameter.

In old rice-paddies and fallow lands, La Loma, rare, fl. Nov.–Dec.; of local occurrence in the Philippines. India to China, Malaya, and Australia.

15. PALMAE (PALM OR ANAHAO FAMILY)

Erect shrubs or trees, slender or very large, sometimes climbing, naked or spiny. Stems unbranched, cylindric. Leaves alternate, at the ends of the stems, palmate, pinnate, or bipinnate, the petioles sheathing. Flowers small, 1- or 2-sexual in panicles or spikes (spadices) that are often more or less enclosed by one or more large sheathing bracts (spathes). Perianth-segments 6, in 2 series, usually all free, imbricate or valvate. Stamens 3 to 6, sometimes more. Ovary 1- to 3-celled, or of 3 1-celled carpels, superior; stigmas 3, usually sessile; ovules 1 or 2 in each cell. Fruit a 1 to 3-celled drupe, or berry-like with 1 to 3 carpels.

Genera 150, species about 1,350, chiefly tropical, 21 genera and over 100 species in the Philippines.

1. Leaves orbicular, palmately lobed.
    2. Inflorescence axillary, pendulous or spreading........................ 1. *Livistona*
    2. Inflorescence a very large, terminal, erect panicle................. 2. *Corypha*

1. Leaves bipinnate; leaflets obliquely rhomboid to lanceolate, strongly inequilateral.. 3. *Caryota*

1. Leaves simply pinnate.
    2. Slender climbing palms, the younger parts armed with spines, also bearing long, retrorsely armed flagellae.................................. 4. *Calamus*

2. Stemless palms growing in brackish swamps, the fruits in very large, peduncled, globose heads........................ 2. *Nipa*
2. Slender or stout, erect, unarmed palms.
   3. Inflorescence borne in the leaf-axils.
      4. Fruit very large, 15 to 30 cm in diameter........................ 6. *Cocos*
      4. Fruit small, not exceeding 5 cm in diameter.
         5. Lower leaflets spinescent; flowers in very dense heads..7. *Elaeis*
         5. Leaves very long; flowers on very long pendulous branches of the inflorescence........................ 8. *Arenga*
   3. Inflorescence borne below the sheaths which are imbricate, cylindric, and enclose the apical portion of the trunk.
      4. Large stout palms with thick swollen trunks, the inflorescence pendulous; fruit less than 1.5 cm long........................ 9. *Oreodoxa*
      4. Slender palms with cylindric trunks.
         5. Flowers in groups of threes, one female between two males, the latter the larger........................ 10. *Normanbya*
         5. Female flowers at the base of the branches of the inflorescence, few, much larger than the males........................ 11. *Areca*

1. LIVISTONA R. Brown

Tall palms with annulate trunks, the leaves fan-like, orbicular, flabellately plicate, split to the middle into slender, 2-fid lobes; petioles long, their margins spinous. Inflorescence in the leaf-axils, long-peduncled, loosely and narrowly panicled, elongated, pendulous in fruit; spathes many, small, tubular, sheathing. Flowers small, perfect. Sepals 3, imbricate. Corolla-lobes 3, valvate. Stamens 6, their filaments united in a ring. Ovary of 3 nearly free carpels. Fruit a small globose drupe. (In honor of P. Murray, Baron of Livistone.)

Species about 20, tropical Asia, through Malaya to Australia, 6 or 7 in the Philippines.

1. L. rotundifolia Mart. Anahao (Tag.).

A tall palm reaching a height of 15 to 20 m, the trunk straight, smooth, marked with close annular scars. Leaves crowded at the apex, their petioles long and armed on the sides with sharp hard teeth. Leaf-blades orbicular, plaited, base cordate, about 1 m in diameter, cleft into numerous 2.5 to 4 cm wide segments, those in the middle about 20 cm long, toward the sides longer, all cleft at the apex into 2, lanceolate, acuminate, 3 to 5 cm long lobes. Inflorescence axillary, pendulous, up to 1.5 m long, composed of sheathing partial spathes and spreading branches. Flowers small, sessile, numerous, about 2 mm long. Fruit globose, somewhat fleshy, yellowish, about 1.5 cm in diameter.

Occasionally cultivated for ornamental purposes; of local occurrence in the Philippines. Celebes; cultivated in other tropical countries.

Several other species of this genus are cultivated in Manila, but no mature specimens of them have been observed.

2. CORYPHA Linnaeus

Tall, stout, unarmed palms, dying after once flowering and fruiting. Leaves very large, fan-like, suborbicular, with many narrow lobes, the petioles long, stout, spiny on the margins. Inflorescence very large, terminal, erect, branched. Flowers small, perfect, spicately arranged on the ultimate branchlets in groups of threes. Calyx cupular, 3-fid. Petals

3, connate below. Stamens 6. Ovary 3-lobed, 3-celled. Fruit globose, drupaceous. (Greek "summit," in allusion to the inflorescence.)

Species about 6 in tropical Asia and Malaya, 1 in the Philippines.

1. **C. elata** Roxb. Buri, Buli (Tag., Vis.).

Trunk erect, straight, up to 0.7 m in diameter and 20 m high. Leaves suborbicular, up to 3 m long, palmately split into about 100, lanceolate, acuminate, 1.5 to 6 cm wide segments extending one-half to two-thirds to the base; petioles very stout, about 3 m long, 20 cm thick at the base, margins armed with very stout black spines. Inflorescence pyramidal, up to 7 m in height, the lower branches up to 3.5 long, the upper ones gradually shorter, the ultimate branches up to 1 m in length. Flowers very numerous, greenish-white, 5 to 6 mm in diameter. Fruit globose, fleshy, 2 to 2.5 cm in diameter, the seed hard, globose, 1.5 cm in diameter.

Occasionally cultivated in Manila for ornamental purposes, our largest palm; widely distributed in the Philippines. India to Malaya.

3. CARYOTA Linnaeus

Medium or stout palms with axillary inflorescences and few, large, bipinnate leaves. Leaflets wedge-shaped to lanceolate, broad or narrow, apex very oblique, variously toothed or incised. Inflorescence medium or very large, the peduncles stout, decurved, the uppermost one developing first. Sheathes (spathes) 3 to 5, small or large. Spadices fastigiately branched, the branches pendulous. Flowers many, in threes, a female between two males. Male flowers: Sepals 3, rounded. Petals 3, oblong, valvate. Stamens 6 to many. Female flowers: Sepals and petals rounded. Ovary 3-celled. Fruit small, globose, 1- or 2-seeded. (An ancient Greek name for a kind of date.)

Species about 12, tropical Asia, through Malaya to Australia, 4 or 5 in the Philippines.

Stamens 6, the flowers small; inflorescence less than 1 m long; leaves less than 2 m long.. 1. *C. cumingii*

Stamens about 40, the flowers rather large; inflorescence up to 2 m long; leaves up to 3.5 m long.. 2. *C. maxima*

1. **Caryota cumingii** Lodd. Pugahan, Taquipan (Tag.).

A rather slender palm reaching a height of 5 m. Leaves scattered along the upper part of the trunk, spreading, up to 1.5 m long; petiole very short; pinnae about 10 on each side of the midrib, up to 1 m long; leaflets numerous, up to 20 cm long, broad, flabelliform, 2 sides straight, the apex obliquely truncate, irregularly and prominently toothed, obliquely acuminate. Inflorescence axillary, pendulous, up to 80 cm long, the peduncle about 3 cm in diameter, the spathes small, not exceeding 20 cm in length. Spikes numerous, furfuraceous, slender, up to 50 cm long. Male flowers dull-purplish and yellow, the petals about 5 mm long. Stamens 6. Fruit globose, purple, fleshy, containing a single globose seed.

Occasionally cultivated, fl. continuously, from the upper axils first, until exhausted; widely distributed in the Philippines. Endemic.

2. **C. maxima** Blume. Pugahan, Taguipan (Tag.).

Trunk stout, cylindric. Leaves large, bipinnate, up to 3.5 m long, the petioles sheathing, their margins with stout black fibers; pinnae up to 20 on each side of the midrib, the lower and middle ones up to 1.5 m long, shorter upward; leaflets numerous, 20 to 45 cm long, flabellate to linear-lanceolate, straight on the lower side, curved and variously irregularly toothed on the upper, acuminate. Inflorescence very large, pendulous, up to 2 m in length, the peduncles curved, 10 cm in diameter, the spathes large, the first up to 40 cm long, the largest 1 m in length. Spikes very numerous, furfuraceous, 80 to 150 cm long. Male flowers 2 cm in diameter. Petals oblong-ovate, dull-purplish and yellow, 10 to 11 mm long. Stamens about 40.

Occasionally cultivated, fl. continuously, from the upper axils first, until exhausted, when the tree dies. Java.

4. CALAMUS Linnaeus

Spiny, slender, climbing, rarely erect palms, the leaves, sheaths, or inflorescences bearing long, slender, retrorsely armed flagellae. Leaves alternate, pinnate, the leaflets entire, acuminate, the sheaths spiny, produced into a ligule or ochrea. Inflorescence axillary, usually elongated, branched. Spathes tubular or open, persistent, sheathing the peduncle and branches of the inflorescence, close or distant, passing into bracts and bracteoles. Flowers small, polygamo-dioecious, in distichous often scorpoid spikes. Male flowers with a cupular 3-toothed calyx. Petals 3, acute, valvate. Stamens 6. Female flowers with a calyx as in the males. Corolla tubular below, 3-fid. Staminodes forming a cup. Fruit globose to ovoid, 1-seeded, covered with appressed, imbricated, spirally arranged scales. (Greek "reed.")

Species about 175, tropical Asia to Australia, few in tropical Africa, about 35 in the Philippines.

1. **C. mollis** Blanco. Uay (Tag.); Bejuco (Sp.-Fil.); Rattan.

A climbing slender palm 2 to 3 to many meters in length, the stems 10 to 12 mm in diameter, the younger parts armed with sharp slender spines. Leaves about 80 cm long, the rachis not produced, armed beneath with short, curved spines; leaflets linear-lanceolate, acuminate, 20 to 30 cm long, margins with short, slender, spiny teeth. Inflorescence leaf-opposed, the rachis slender, armed with reflexed spines, up to 1.5 m in length, the tip produced as a long armed flagella. Partial inflorescences, few, remote, 6 to 15 cm long. Flowers yellow, fragrant, the males about 3 mm long, crowded in distichous, straight or curved, linear-oblong, 1 to 2.5 cm long spikes, 9 to 15 to each partial inflorescence. Fruits many, ellipsoid, apiculate, about 1 cm long. (Fl. Filip. *pl. 99.*)

In thickets, Pasay, occasional, fl. most of the year; widely distributed in the Philippines. Endemic.

Young plants of some other species of this genus are commonly cultivated in Manila for ornamental purposes; one of the most common being *C. discolor* Mart., the leaves white on the lower surface.

5. NIPA Wurmb

A gregarious palm of brackish swamps, from stout, branched rootstocks. Leaves elongated, pinnate; leaflets lanceolate, entire. Inflorescence erect, from the rootstock, the male with many, brown, imbricate sheaths (spathes), the male flowers small, mixed with slender bracteoles, in catkin-like lateral branches of the spadix. Sepals linear, the tips broad, inflexed. Petals smaller. Stamens 3. Female flowers much larger than the males, in globose terminal heads. Fruit large, globose, of many, dark-brown, somewhat compressed, obovoid, more or less angular, fibrous, 1-seeded carpels. (From the Malay name.)

A monotypic genus.

1. **N. fruticans** Wurmb. Nipa, Sasa (Tag.).

Rootstock stout, subterranean, the trunk none. Leaves at the ends of the rootstocks, 5 to 10 m long, the petioles stout; leaflets numerous, rigid, lanceolate, slenderly acuminate, up to 1 m long, 2 to 7 cm wide. Male inflorescence brown, erect up to 1 m in height. Peduncles of the female inflorescence stout, 1 m high or less, the fruit globose, nodding, up to 30 cm in diameter. Carpels numerous, dark-brown, striate, smooth 10 to 14 cm long, compressed, obovate. Seed hard, white. (Fl. Filip. *pl. 386.*)

Along tidal streams, occasional, but usually immature specimens near Manila; along tidal streams throughout the Philippines. India through Malaya to Australia.

6. COCOS Linnaeus

Stout, unarmed, monoecious palms. Leaves long, pinnate, the leaflets narrow, acuminate. Spadix axillary, at first erect, later drooping, panicled, the branches bearing scattered female flowers below and more numerous males above, or often with males intermixed with females. Spathes 2 or more, short, the bracts various. Male flowers unsymmetric, the sepals small, valvate, the petals oblong, acute. Stamens 6. Female flowers much larger than the males, ovoid, the perianth enlarged in fruit. Sepals imbricate. Petals shorter than the sepals. Ovary 3-celled. Fruit large, ovoid, 1-seeded, the pericarp thick, fibrous, the endocarp very hard, with 3 basal scars or pores. (From the Portuguese *coco* or *coquo*, "monkey," from fancied resemblance of the 3 scars at the base of the fruit to a monkey's face.)

Species about 30 in tropical America, 1 cosmopolitan in the tropics.

*1. C. NUCIFERA L. Niog (Tag.); Coco (Sp.); Coconut.

A tall palm reaching a height of 25 m, the trunk stout, marked with annular scars, base thickened. Leaves 4 to 5.5 m long, crowded at the apex of the trunk, the petiole stout, 1 m or more in length; leaflets very numerous, linear-lanceolate, acuminate, coriaceous, up to 1 m in length. Inflorescence 1 m long or less. Fruit variable in shape and size, obovoid to subglobose, often obscurely 3-angled, 15 to 25 cm long. Albumen lining the bony endocarp. (Fl. Filip. *pl. 364.*)

Frequently cultivated, fl. all the year; throughout the Philippines in cultivation. Undoubtedly a native of tropical America, but of prehistoric distribution all over the tropics; there is no evidence of its being an indigenous plant in the Philippines.

7. ELAEIS Jacquin

Erect unarmed palms, the trunks solitary. Leaves large, pinnate, the segments narrow, acuminate, the lower ones reduced to spines. Inflorescence axillary, branched, short, dense, the spadices stout, the peduncles short, subtended by laxly imbricate bracts, the male and female flowers in different inflorescences. Male flowers small, imbricate, in dense cylindric spikes. Sepals oblong or lanceolate, concave, imbricate. Petals oblong. Stamens 6, the filaments united into a thick cylindric tube. Female flowers much larger than the males, arranged in congested branched inflorescences, the perianth acrescent. Ovary ovoid, 3- to 1-celled. Fruit ovoid to obovoid, 1- to 3-seeded, the pericarp oily, the endocarp hard. (Greek name of the olive.)

Species 6 or 7 in tropical America and Africa, 1 introduced in the Philippines.

*1. E. GUINEENSIS Jacq. Oil Palm.

An erect palm 4 to 10 m high, the leaves numerous, 3 to 4.5 m long, the petioles broad, armed on the sides with spinescent reduced leaves. Leaflets numerous, linear-lanceolate, acuminate, nearly 1 m long, 2 to 4 cm wide. Male inflorescence dense, of numerous, cylindric, 7 to 12 cm long spikes which are about 1 cm in diameter, their rachises excurrent as a stout awn. Female inflorescence dense, branched, 20 to 30 cm long, the flowers densely disposed, the fruits borne in large dense masses.

Occasionally cultivated, fl. all the year. A native of tropical Africa, now cultivated in most tropical countries, and in some regions of great economic importance on account of the oil yielded by its seeds.

8. ARENGA Labillardière

Stout palms with very long, erect or ascending, pinnate leaves, the trunk densely clothed with the stout, black, fibrous remains of the sheaths; leaflets very numerous, long, linear, usually more or less irregularly toothed at the apex, sometimes lobed, base often 1- or 2-auricled. Spadices in the leaf-axils, the upper one flowering first, and then the lower ones successively, large, much-branched, long, pendulous. Male and female flowers usually solitary and in separate spadices, sometimes in threes, a female between two males. Male flowers: Sepals orbicular, imbricate. Petals oblong, valvate. Stamens many. Female flowers subglobose, the sepals enlarging, the petals triangular, valvate; staminodes many or none. Fruit subglobose to broadly obovoid, 2- or 3-seeded. (From the Malayan name.)

Species about 10, tropical Asia, Malaya, and Australia, about 5 in the Philippines.

1. A. SACCHARIFERA (Wurmb.) Labill. Caong, Iroc (Tag.); Cabo negro (Sp.-Fil.); Sugar Palm.

Trunk stout, marked with rather distant annular scars, up to 12 m high. Leaves 6 to 8.5 m long, ascending, the sheathing basal parts with stout, black fibers; leaflets up to 100 or more on each side, linear, 1 to 1.5 m long, the tip lobed and variously toothed, the base 2-auricled, the lower surface white or pale. Inflorescence axillary, the peduncle stout, decurved, the pendulous branches very numerous, up to 1.5 m in length. Male flowers in pairs, about 12 mm long. Fruit globose on depressed-globose, about 5 cm in diameter, produced in great abundance. (Fl. Filip. *pl. 419.*)

Rare in Manila in cultivation, fl. all the year; throughout the Philippines, but undoubtedly introduced. India to Malaya.

9. OREODOXA Willdenow

Large unarmed palms, the trunks solitary, cylindric or thickened in the middle. Leaves terminal, pinnate, the segments narrowly linear-lanceolate, unequally 2-fid at the apex; sheaths elongated, cylindric, imbricate, enclosing the top of the trunk. Inflorescence below the sheaths, the spadix large, the branches elongated, slender, pendulous, the spathes 2, the lower one nearly cylindric, as long as the spadix. Flowers small, monoecious, the lower ones in groups of threes, the upper ones in pairs or solitary. Male flowers: Sepals minute. Petals ovate, acute, valvate, thinly coriaceous, connate at the base. Stamens 6, 9, or 12, exserted, the filaments adnate to the base of the petals. Female flowers smaller than the males. Corolla urceolate, 3-lobed to the middle, the lobes triangular, acute. Staminodes 6, scale-like, connate. Ovary subglobose, 2-celled. Fruit obovoid or oblong-ovoid, 1-celled, 1-seeded. (Greek "mountain" and "glory.")

Species 5, in tropical America, 1 now cultivated in many other tropical countries.

*1. O. REGIA HBK. Royal Palm.

A stout palm reaching a height of 25 to 30 m. Trunk swollen in the middle, tapering below and above, base swollen, up to 60 cm in diameter. Leaves crowded at the apex, up to 3.5 long, their sheaths elongated, imbricate; leaflets very numerous, narrow, 60 to 90 cm long, acuminate. Spadix 50 to 60 cm long. Staminate flowers 6 to 7 mm long, the pistillate about one-half as large. Drupe oval-oblong, about 13 mm long, violet-blue when mature.

Mature specimens in the old Botanical Garden, younger ones now quite generally distributed about the city. A native of tropical America.

10. NORMANBYA F. Mueller

Trunk erect, annulate. Leaves pinnate, their sheaths imbricate and surrounding the top of the stem, the rachis somewhat curved. Inflorescence borne just below the sheaths, paniculate, its branches spreading, the peduncle short. Flowers in groups of threes on the ultimate branchlets, sessile, one female between two males. Male flowers symmetric. Calyx cupular, the sepals 3, imbricate. Corolla twice as long as the calyx, the petals 3. Stamens numerous. Rudimentary ovary conspicuous. Female flowers globose-conical. Sepals strongly imbricate. Petals short, very broad. Ovary 1-celled, 1-ovuled. Fruit drupaceous, the pulp thin, the seed with ruminated albumen, the calyx somewhat accescent and surrounding the base of the fruit. (In honor of —— Normanby.)

Species 2, 1 in New Guinea, 1 in the Philippines.

1. **N. merrillii** Becc. Bunga de China, Bunga de Jolo (Tag.).

A rather slender palm reaching a height of 5 to 6 m, the trunk about 25 cm in diameter, marked with annular scars. Leaves about 2 m long, strongly arched, the sheaths cylindric, about 0.5 m long; leaflets about 50 on each side, narrowly lanceolate, about 70 cm long and 4 to 5 cm wide. Spadix forming a divaricately branched glaucous panicle, 40 to 50 cm long. Male flowers 10 to 12 mm long. Fruit bright-red, elliptic-ovoid, smooth, 3 cm long, pulp scanty, the mesocarp fibrous.

Commonly cultivated, fl. at most seasons; probably a native of Palawan. Endemic.

11. ARECA Linnaeus

Trunk erect, rather slender, tall, annulate. Leaves pinnate, their sheaths imbricate and surrounding the top of the stem. Inflorescence borne just below the sheaths, finely branched. Male flowers numerous, very small. Sepals small. Petals obliquely lanceolate, valvate. Stamens 3 or 6; anthers basifixed. Female flowers much larger, few at the base of the branches, the perianth enlarging. Sepals and petals orbicular, imbricate, the latter with acute valvate tips. Ovary 1-celled. Fruit ovoid to oblong, red; pericarp fibrous. Seed with ruminate albumen. (From the Malabar name.)

Species about 35, tropical Asia to Australia, 7 in the Philippines.

*1. A. CATECHU L. Bunga (Tag.); Betel-nut Palm.

Trunk erect, slender, up to 25 m high, marked with annular scars. Leaves up to 5 m long, the leaflets numerous, 60 to 90 long, the upper ones confluent. Spadix much-branched, the branches filiform above, bearing very numerous, somewhat distichous male flowers which are yellow and about 5 mm long. Female flowers at the bases of the branches and in the axils, 1 cm long or more. Fruit ovoid, smooth, red, 4 to 6 cm long, the pericarp somewhat fleshy, the mesocarp fibrous. (Fl. Filip. *pl. 350.*)

Commonly cultivated, fl. all the year; throughout the Philippines in cultivation, certainly of prehistoric introduction. India to Malaya, frequently only cultivated; probably a native of India.

16. ARACEAE (ARUM OR GABI FAMILY)

Perennial plants from rhizomes or fleshy corms, with radical leaves, suffrutescent or woody vines, or in one genus aquatic and floating. Leaves alternate, various. Flowers 1- or 2-sexual, sessile on a spadix which is more or less enclosed by a green, white, or colored spathe, if 1-sexual the males usually above the females, neuter flowers often between them. Perianth none, or of 4 to 6 scale-like segments. Anthers 2- to 4-celled. Ovary sessile, 1- to 3-celled; ovules 1 or more. Fruit baccate, 1- to many-seeded.

Genera 110, species more than 1,000, in all parts of the world, chiefly tropical, 20 genera and about 65 species in the Philippines.

1. Coarse climbing vines with large, entire or pinnately lobed leaves.
    2. Leaves not mottled; ovaries sub-2-celled, many ovuled. 1. *Raphidophora*
    2. Leaves pale-green, mottled with yellowish-green or nearly white spots and blotches; ovaries 1-celled, 1-ovuled.......... 2. *Scindapsus*
1. Erect plants, never climbing.
    2. Lettuce-like plants floating on fresh water; leaves and petioles not defined.......... 3. *Pistia*
    2. Terrestrial plants.
        3. Plants from very aromatic rootstocks, the leaves linear, flat, equitant.......... 4. *Acorus*
        3. Plants from large globose corms, the flowers appearing before the leaves, the spathes very large; leaves long-petioled, the blade deeply 3-parted, spreading.......... 5. *Amorphophallus*
        3. Leaves and flowers borne at the same time; plants with broad simple leaves.
            4. Ovaries 2- or 3-celled; cultivated plants with variegated leaves. 6. *Caladium*
            4. Ovaries 1-celled.
                5. Ovules 1 or 2; anther-cells larger than the connective. 7. *Typhonium*
                5. Ovules few to many.
                    6. Ovules few, basal.......... 8. *Alocasia*
                    6. Ovules many, parietal.......... 9. *Colocasia*

1. RAPHIDOPHORA Schott

Coarse, climbing, suffrutescent or woody vines rooting on trees. Leaves long-petioled, large, entire or pinnatifid, the petioles somewhat sheathing. Spathes ovate, boat-shaped, acute or acuminate, deciduous. Spadix sessile, elongated, cylindric, the flowers crowded, perfect, the perianth none. Stamens 4; filaments linear, broad, longer than the anthers. Ovary truncate, sub-2-celled, with many parietal placentae, 4- to 6-angled. Berries many-seeded, confluent. (Greek "needle" and "to bear," in allusion to the minute stinging crystals in the pulpy part of the fruit.)

Species 61, tropical Asia to Australia and Polynesia, about 5 in the Philippines.

1. **R. merrillii** Engl. Tibatib (Tag.); Amlong (Bic.).

A stout vine climbing on tree-trunks, reaching a height of 5 to 6 m. Leaves oblong-ovate in outline, up to 60 cm long, pinnately cleft nearly or quite to the midrib into 7 to 12 pairs of lanceolate, acuminate, falcate, 1-nerved lobes 12 to 20 cm long, 2 to 5 cm wide. Spathes several, terminal, white or greenish, in flower about 15 cm long, acuminate, deciduous. Spadix green, dense, cylindric, nearly or quite as long as the spathe, 2 to 2.5 cm thick in flower, thicker in fruit. (Fl. Filip. *pl. 399, Scindapsus pertusus.*)

Not uncommon in dry thickets, Pasay, Masambong, etc., also frequently cultivated, fl. Jan.–March; widely distributed in the Philippines. Endemic.

2. SCINDAPSUS Schott

Climbing on trees, herbaceous or somewhat woody. Leaves long-petioled, the petiole geniculate at the apex, base somewhat sheathing, the blades ovate to oblong-lanceolate, acuminate, entire or lobed, often large and sometimes variegated. Peduncles short. Spathes boat-shaped, deciduous. Spadix sessile or nearly so, cylindric, densely many-flowered, shorter than the spathe. Flowers perfect, the perianth none. Stamens 4. Ovary somewhat 4-angled, truncate, 1-celled, 1-ovuled; style none. Fruit drupaceous, more or less united, often large. (Ancient Greek name for some kind of a vine.)

Species 21, India to the Solomon Islands, 3 or 4 in the Philippines.

*1. S. AUREUS (Lindl. & André) Engl. (*Pothos aureus* Lindl. & André).

A stout vine climbing on trees by means of roots, reaching a height of 10 m or more, often with long, pendulous branches. Petioles 25 to 40 cm long, geniculate at the apex, base sheathing. Leaves thinly coriaceous, smooth and shining, pale-green, variously blotched with pale-yellow or nearly white spots on the upper surface, entire, or in mature specimens more or less incised, 30 to 75 cm long, 25 to 40 cm wide, those on the pendulous branches frequently very much reduced in size. Flowers and fruits unknown.

Commonly cultivated, but rarely or never flowering. A native of the Solomon Islands, now widely distributed in cultivation; of comparatively recent introduction here.

3. PISTIA Linnaeus

A floating stemless herb in fresh water, the leaves obovate-cuneate, erect, together forming a cup-like plant. Spathe small, tubular below, open above. Spadix adnate to the back of the spathe, free above. Male inflorescence of few, sessile, connate anthers beneath the apex of the spadix.

Female inflorescence a solitary, conical-ovoid, 1-celled ovary; ovules many. Fruit membranaceous, few-seeded. (Probably from the Greek "watery," in allusion to its habitat.)

A monotypic genus.

1. **P. stratiotes** L. Quiapo (Tag.).

Leaves few or many, 2.5 to 15 cm long, the basal part thickened, of very porous tissue, truncate or rounded, somewhat pubescent, the nerves raised on the lower surface. Spathes few, tomentose, white, about 12 mm long, oblique, short-peduncled, in the center of the rosette of leaves. (Fl. Filip. *pl. 468.*)

Floating on stagnant water, sometimes rooting on muddy banks, abundant, fl. at intervals; throughout the Philippines. Tropics generally.

4. ACORUS Linnaeus

Herbs growing in wet soil, from very aromatic rootstocks. Leaves 2-ranked, equitant at the base, ascending, sword-shaped, coriaceous. Peduncle leaf-like, continued as the ensiform spathe. Spadix cylindric, dense, sessile, flowering at the base first. Flowers small, perfect. Sepals 6, orbicular. Stamens 6. Ovary conical, 2- or 3-celled; ovules many. Fruit a few-seeded berry. (An ancient name, origin obscure.)

Species few in the north-temperate regions, 2 in the Philippines.

* 1. **A. CALAMUS** L. Acoro (Sp.); Lubigan (Tag., Vis.); Sweet Flag.

Rootstock stout, branched, aromatic. Leaves linear, flat, smooth, acuminate, 25 to 60 cm long, 1 to 1.5 cm wide. Peduncle compressed. Spathe green, much-elongated, similar in shape to the leaves. Spadix 3 to 5 cm long, 1 cm or less in diameter, densely flowered.

Occasionally cultivated, certainly introduced; I have seen no Philippine specimens in flower. Of wide distribution in the northern parts of both hemispheres.

5. AMORPHOPHALLUS Blume

Herbs from large fleshy corms, flowering before the leaf appears. Leaves with a long, roughened and mottled petiole, 3-parted, the segments spreading, pinnately lobed or dissected. Spathe various, often very large, campanulate and open, or convolute and ovoid, the limb short and broad, or narrower and much elongated. Spadix included or exserted, the appendage large, short or long, the flower-bearing part short, cylindric, male and female flowers contiguous. Anthers 2 to 4, sessile. Ovaries globose to obovoid, 1- to 4-celled; ovules solitary. Fruit a globose to ovoid, fleshy, 1- to 4-seeded berry.

Species about 80 in the tropics of the Old World, 5 in the Philippines.

1. **A. campanulatus** (Roxb.) Blume. Pungapung (Tag., Vis.).

Corm depressed-globose, up to 30 cm in diameter. Leaves usually solitary, the petiole stout, up to 1.2 m high, warty-roughened, mottled with gray, the blades up to 1 m in diameter, trisected, the segments dichotomous, the ultimate ones pinnately divided into oblong to oblong-obovate, acuminate lobes. Spathe sessile, broadly campanulate, dull-purplish, margins somewhat spreading or recurved, waved and crenulate, up to 30 cm in diameter. Spadix hardly longer than the spathe, the appendage ovoid, variously sulcate or depressed, up to 15 cm long, foetid when in flower.

In dry thickets, Masambong, San Juan del Monte, etc., also occasionally cultivated, fl. Jan.–Feb.; common and widely distributed in the Philippines. India to Madagascar through Malaya to the Fiji Islands.

6. CALADIUM Ventenat

Herbs from fleshy subglobose corms, the leaves petioled, ovate to oblong, sagittate or cordate, peltate or not, usually variously variegated. Peduncles solitary, erect. Spathe-tube convulute, persistent, ovoid, somewhat constricted above, the limb boat-shaped. Spadix erect, shorter than the spathe, the male part about twice as long as the female. Male flowers naked. Stamens 3 to 5. Female flowers with a 2- rarely 3-celled ovary; ovules numerous; style none. Fruit a many-seeded berry. (Name of obscure origin.)

Species about 10 with an indefinite number of varieties in tropical America.

1. C. **BICOLOR** (Ait.) Vent. Corazon de Maria (Sp.-Fil.).

Leaves ovate to oblong-ovate, peltate, 10 to 40 cm long, apex acuminate, base deeply cordate, the basal lobes somewhat spreading, usually rounded, of great variation in color, the upper surface green with scattered spots and blotches of red and white (var. *wightii* Engl.) or the entire center red or pink (var. *splendens* Engl., or the whole leaf pale-green blotched with still paler-green and white (var. *albomaculatum* Engl.). Spathe stout, about 10 cm long, the limb white, boat-shaped, the tube green, often tinged with purple.

Commonly cultivated and at least subspontaneous, fl. most of the year. A native of tropical America, apparently of early introduction here. There is an indefinite number of varieties based mostly on the different variations in leaf-color and markings.

7. TYPHONIUM Schott

Leaves and scapes erect from fleshy corms, the leaf-blades entire, or 3- to 5-lobed or angled. Spathe with a broad, short tube which is persistent and contracted at the mouth, the limb linear to ovate-oblong deciduous. Spadix exserted, the male and female flowers distant, with neuter flowers above the females and sometimes below the males, the appendage smooth, elongated. Anthers 1 to 3, sessile or nearly so. Ovary 1-celled, 1- or 2-ovuled. Fruit an ovoid, 1- or 2-seeded berry. (From a name of Greek mythology, "the God of storms.")

Species about 15 in the tropics of the Old World, 2 or 3 in the Philippines.

1. T. **cuspidatum** Blume.

Tubers subglobose, 1 to 1.5 cm in diameter. Leaves several, their petioles 7 to 14 cm long, the blades thin, cordately or hastately ovate to oblong, 6 to 14 cm long, apex acuminate. Spathe inflated, green, 1.5 cm in diameter below, then narrowed and contracted, the limb purplish, 1.5 to 2 cm wide, reflexed, gradually narrowed into a long, slender, erect, ultimately pendulous tail, 8 to 16 cm long, deciduous. Appendage to the spadix erect, white, gradually narrowed upward, about 4 mm thick below, as long as the spathe-limb.

In thickets, Masambong, Malate, Pasay, etc., fl. Aug.–Dec.; apparently not common in the Philippines. Bengal to the Malay Peninsula and Archipelago.

Typhonium trilobatum (L.) Schott, a native of Ceylon with large, deeply 3-lobed leaves, 10 to 20 cm long, and spathes 12 cm long or more, its blade purplish and 5 to 7 cm wide has been cultivated in Manila, but I have seen no specimens. *T. divaricatum* Decne. (Fl. Filip. *pl. 380.*), also with 3-lobed leaves 4 to 6 cm long, and spathes somewhat similar to the above is occasionally cultivated. This species extends from India to Japan southward to Malaya, introduced here.

8. ALOCASIA Schott

Small to very coarse herbs from fleshy corms, sometimes with a short stout caudex. Leaves oblong to ovate, base deeply cordate, peltate or not, entire or variously lobed. Spathe erect, peduncled, the tube ovoid, the limb usually elongated, deciduous. Spadix shorter than the spathe, the male and female flowers usually separated by interposed neuter ones. Ovaries 1-celled; ovules few, basal, erect. Berries few-seeded. (Name altered from *Colocasia.*)

Species 25 or more, tropical Asia to Malaya, many now cultivated in other countries for ornamental purposes, about 10 in the Philippines.

1. Leaves peltate, the blades green above with white veins, often purple beneath.. 1. *A. sanderiana*
1. Leaves not peltate.
  2. Leaves very deeply pinnately lobed, the lobes distant, oblong to oblong-lanceolate.. 2. *A. portei*
  2. Leaves entire or at most undulate.
    3. Very coarse plants with stout stems and very large leaves 0.5 to 1.5 m in length.. 3. *A. indica*
    3. Smaller plants without distinct stems.
      4. Leaves broadly ovate, 35 to 65 cm long; petioles mottled. 4. *A. zebrina*
      4. Leaves oblong to oblong-lanceolate, 15 to 25 cm long. 5. *A. heterophylla*

1. **A. sanderiana** Bull.

A small or medium sized glabrous plant from underground rootstocks. Leaves oblong-ovate to broadly lanceolate-ovate, acuminate, the base peltate, deeply lobed, 15 to 40 cm long, the margins rather deeply undulate-lobed, the basal lobes rather narrow spreading; upper surface dark-green, the nerves and sometimes the margins white, the lower surfaces usually purple or tinged with purple. Peduncles erect, shorter than the leaves. Spathes greenish, about 5 cm long. Spadix greenish-white, nearly as long as the spathe.

A very ornamental species occasionally cultivated for its striking leaves, a native of Mindanao. Endemic. Frequently cultivated in Europe and America.

2. **A. portei** (Schott) Engl. & Becc.

Stem stout, erect, usually less than 1 m high. Leaves green, oblong-ovate in outline, up to 1 m in length, deeply pinnately lobed, the lobes narrow, oblong to lanceolate-ovate, distant, the base deeply cordate, not peltate, the basal lobes narrow, prominently lobed. Spathes peduncled, the tube about 4 cm long, accrescent, the blade 20 cm long or more. Staminate part of the spadix 4 to 5 cm long, cylindric, the appendage up to 13 cm in length.

Occasionally cultivated for its ornamental leaves. Not uncommon in Luzon and probably occurs in other parts of the Philippines. New Guinea.

3. (**A. indica** (Roxb.) Schott.) Biga (Tag.); Badiang (Vis.); Elephant's Ear. Alocasia macrorrhiza (L.) Schott.)

A coarse erect plant, the trunk stout, up to 2 m in height. Leaves very large, broadly ovate, the larger ones up to 1.5 m in length, margins slightly undulate, apex acute or acuminate, base deeply cordate, not at all peltate, the petioles long, very stout. Spathes peduncled, the tube 4 to 5 cm long, the blade yellowish to yellowish-green, up to 23 cm long and, when spread, 9 cm wide, often slightly mottled with purple inside. Pistillate part of the spadix 3 to 4 cm long, about 1.5 cm thick, contracted above, the fertile part of the male inflorescence about 6 cm long, the appendage 15 cm in length. Berries red when mature, globose or ovoid, fleshy. (Fl. Filip. *pl. 177, A. montana.*)

Commonly cultivated, occasionally also found in waste places, vacant lots, etc., fl. all the year; common and widely distributed in the Philippines. India to Malaya.

* Var. VARIEGATA Engl., differs from the species in having the leaves strongly mottled with white or gray.

Occasionally cultivated for ornamental purposes.

4. **A. zebrina** C. Koch & Vietch.

Stem short or none, petioles equaling or longer than the leaves, prominently striped or blotched with dark-green and white. Leaves broadly ovate, base deeply cordate, not peltate, entire, 35 to 65 cm long, the apex very shortly and sharply acuminate, the basal lobes oblong-ovate, 15 to 20 cm in length. Spathes long-peduncled, greenish, the tube 2.5 to 3.5 cm long, the blade about 10 cm in length, longer than the white spadix.

Occasionally cultivated; a species known only from Luzon.

5. **A. heterophylla** (Presl) Merr.

Rather slender plants from underground rhizomes, glabrous. Leaves 15 to 25 cm long, green, oblong to oblong-lanceolate, sharply and slenderly acuminate, entire or only slightly undulate, the base deeply cordate, not peltate, the basal lobes spreading or not, oblong to lanceolate, narrow, obtuse, 6 to 10 cm long. Spathes slenderly peduncled, white, 6 to 7 cm long, the limb 4 to 5 cm long, longer than the slender spadix, soon reflexed and deciduous.

Occasionally cultivated. A widely distributed endemic species.

9. COLOCASIA Linnaeus

Coarse herbs from fleshy corms, with a short caudex, producing flowers and leaves at the same time. Leaves ovate, peltate at the cordate base, stoutly petioled. Spathe erect, peduncled, the tube thick, accrescent, persistent, constricted at the mouth, the limb erect, elongated, deciduous. Spadix shorter than the spathe, slender or stout, the male and female flowers usually separated by interposed flat neuter ones; appendage cylindric, subulate, or none. Ovaries ovoid, 1-celled; ovules many, orthotropous. Berries small. (An ancient Greek name.)

Species 6 or 7, in tropical Asia to Polynesia, 1 in the Philippines.

1. C. ESCULENTUM (L.) Schott (*C. antiquorum* Schott). Gabi (Tag.); Taro.

Leaves two or three or more, long-petioled, ovate, 20 to 50 cm long, glaucous, entire, acute or shortly and sharply acuminate, with a broad, triangular, basal sinus extending one-third or half-way to the insertion of the petiole, the basal lobes broad, rounded; petiole green or purplish, 0.2 to 1 m long. Peduncles usually solitary. Spathe variable in length but usually about 20 cm long, the tubular part green, usually about 4 cm long, the limb lanceolate, acuminate, involute, yellow, about 20 cm long. Spadix cylindric, about 8 cm long, green below, yellow or straw-colored above.

Commonly cultivated in low wet lands, fl. Sept.–Dec.; in general cultivation throughout the Philippines. Probably a native of India, now cultivated in all tropical countries.

In addition to the species considered above, some exotic forms are cultivated, especially of the American genera *Anthurium* and *Philodendron*. No attempt has been made to include these forms as material for proper classification has not been available.

17. LEMNACEAE (DUCKWEED OR LIA FAMILY)

Small or minute, green, scale-like plants, rootless or with capillary roots, floating on stagnant fresh water, propagated by budding, or by bulbils, rarely flowering. Flowers monoceious, 1 to 3 from the margins or upper surface, naked or in a spathe, the perianth none. Stamens 1 or 2. Ovary 1-celled, 1- to 7-ovuled.

Genera 3, species about 20, in all countries, all genera and 4 or 5 species in the Philippines.

Plants bearing a single root.. 1. *Lemna*
Plants bearing several to many roots........................ 2. *Spirodela*

1. LEMNA Linnaeus

Small floating plants bearing a single root, the flowers borne in marginal clefts. Filaments slender; anthers 2-celled. Ovules 1 or more. (Greek name of a water plant.)

Species about 15 in all countries, 2 or 3 in the Philippines.

1. **L. paucicostata** Hegelm. Lia (Tag.); Duckweed.

Plant flat, green or both surfaces, elliptic to oblong-ovate, rounded, very slightly inequilateral, faintly or distinctly 3-nerved, 2 to 4 mm long.

Common on stagnant pools of fresh water, sometimes nearly covering the surface; throughout the Philippines. Cosmopolitan in the tropics.

2. SPIRODELA Schleiden

Differing from *Lemna* in the plants bearing several to many roots.

Species 2, of wide distribution, 1 in the Philippines.

1. **S. polyrrhiza** (L.) Schleid. Lia (Tag.).

Plant nearly or quite flat, orbicular to obovate, rounded, 4 to 7 mm long, faintly about 7-nerved, the upper surface green, the lower one purplish.

Floating on pools of stagnant fresh water, occasional; widely distributed in the Philippines. In most temperate and tropical regions.

18. XYRIDACEAE (XYRIS FAMILY)

Tufted or scattered, rigid or wiry, erect herbs, the leaves all radical, grass-like, linear or subulate. Scape simple, naked, elongated, bearing a single head. Flowers sessile, perfect, each subtended by a dark-brown, imbricating, concave, rigid bract. Bracteoles or sepals 3, deciduous, dry, embracing the claws of the petals, the dorsal one often hooded, broader than the 2 lateral ones. Petals 3, clawed, the limb yellow. Stamens 3, inserted at the bases of the petals, included; staminodes 3, or sometimes none. Ovary superior, imperfectly 3-celled; placentas 3, many-ovuled; style trifid. Capsule loculicidally 3-valved or the top circumciss. Seeds small, numerous, linear.

Two genera and about 50 species, in all warm countries, a single genus and 2 species in the Philippines.

1. XYRIS Linnaeus

Character of the Family as given above. (A Greek name of a plant with 2-edged leaves.)

1. **X. pauciflora** Willd.

A slender, erect, tufted or scattered, grass-like plant 15 to 30 cm high. Leaves erect, rather rigid, linear, flat, acuminate, about 2 mm wide, very much shorter than the scape which is slender and exserted. Head ovoid, yellowish-brown, dense, 4 to 6 mm long, the bracts broadly ovate, shining, strongly imbricate. Flowers yellow, small.

In open wet grasslands, old rice paddies, etc., La Loma to Masambong, fl. Oct.–Dec.; rather widely distributed in Luzon. India to China southward to Australia.

19. ERIOCAULACEAE (PIPEWORT FAMILY)

Herbs growing in wet places with narrow leaves crowded in a rosette at the base, the flowers small, crowded in dense, bracteate, globose to ovoid, usually long-peduncled heads, dimerous or trimerous, male and female flowers usually in the same head. Involucral bracts usually wider than the floral ones which are usually longer than the flowers, glabrous or ciliate. Male flowers: Sepals 2 or 3, free or connate, very rarely wanting. Petals 2 or 3, rarely wanting, small, often obscure, inserted at the top of an elongated stipe with the stamens, usually gland-bearing. Stamens 6. Female flowers: Sepals 2 or 3, free, rarely connate. Petals 3, rarely 2 or none, usually oblanceolate, or spathulate, glabrous or ciliate. Ovary 3-, rarely 2-celled; stigmas 3 or 2. Capsules membranaceous, usually 3-lobed; seeds small, solitary, smooth or striate.

Genera 9, species about 575, in the warmer parts of both hemispheres, a single genus in the Philippines.

1. ERIOCAULON Linnaeus

Characters of the Family as given above. (Greek "wool" and "stem.")

Species over 200 in the warmer parts of both hemispheres, 7 or more in the Philippines.

1. Sepals of the female flowers very strongly keeled................ 1. *E. alatum*
1. Sepals of the female flowers narrow, flat, not at all keeled, or rarely wanting.

2. Anthers black; sepals of the female flowers spatulate, very rarely wanting........ 2. *E. merrillii*
2. Anthers white; sepals of the female flowers filiform.... 3. *E. cinereum*

1. **E. alatum** H. Lecomte.

Stems very short, the leaves densely crowded, linear, 2 to 4 cm long, acute or obtuse. Peduncles many, 5-angled or ribbed, slender, 6 to 18 cm long. Head globose or ovoid, dense, pale, shining, 4 to 7 mm in diameter, the floral bracts ovate, glabrous, triangular at the apex, concealing the flowers, the receptacle densely pilose-ciliate. Sepals of the male flowers spathe-like, split down one side, connate. Petals 3, small, not glandular. Stamens black. Female flowers: Sepals 2, free, ovate, obtuse, prominently keeled on the back. Petals 3, small, linear, not glandular; stigmas 3.

In wet rice lands, La Loma, fl. Nov.–Jan.; of very local occurrence in the Philippines. Indo-China.

2. **E. merrillii** Rhul.

Glabrous, the leaves densely caespitose, linear to lanceolate, acute, 2 to 5 cm long. Peduncles many, slightly twisted, 5-ribbed, slender, 3 to 10 cm high. Head obconic-globose to depressed-globose, pale, shining, 3 to 5 mm in diameter; floral bracts oblong-obovate. Sepals of the male flowers connate into a 2- or 3-lobed spathe, split down one side. Petals 3, small, glandular at the tip. Stamens 6; anthers black. Female flowers: Sepals 2, lanceolate, rarely none. Petals 3, linear, or spatulate, minutely glandular at the apex, white. Stigmas 3.

In old rice paddies, low wet lands, etc., Caloocan to Masambong, fl. Aug.–Dec.; widely distributed in the Philippines. Endemic.

3. **E. cinereum** R. Br. (*E. sieboldianum* S. & Z.).

Glabrous, densely caespitose, the leaves linear, 2 to 5 cm long, acuminate. Peduncles numerous, slender, 5-ribbed, 6 to 15 cm long. Heads subglobose, about 4 mm in diameter, the floral-bracts oblong to lanceolate-oblong, the interior ones acute, concealing the flowers, pale, shining. Male flowers with the sepals connate into a spathe, split down one side. Petals very small. Petals none. Styles 3.

In low wet grasslands, old rice paddies, etc., Caloocan, fl. Aug.–Sept.; not common in the Philippines. Tropical Africa and Asia to Japan, southward to Australia.

20. BROMELIACEAE (PINEAPPLE OR PIÑA FAMILY)

Terrestrial or epiphytic herbs. Leaves long, narrow, chiefly basal, rosulate, entire or spiny-toothed, bases usually spreading. Flowers perfect, regular, in dense, terminal spikes, the bracts usually prominent. Sepals 3, free or partly united. Petals 3, free or somewhat united. Stamens 3 to 6, free or somewhat united with the petals. Ovary inferior or superior, 3-celled; styles united; stigmas 3-lobed; ovules many. Fruit of numerous, fleshy, united berries or a 3-valved capsule.

Genera 45, species about 1,000, all American, a single introduced one in the Philippines.

1. ANANAS Adanson

An herb with numerous, elongated, finely toothed, rosulate leaves. Scape short or somewhat elongated, leafy, erect, central, bearing at its apex a simple, dense, cone-like spike. Flowers in the axils of the bracts, perfect. Sepals short, imbricate. Petals violet, free, erect, supplied at the base with 2 small scales. Stamens 6. Ovary inferior, fleshy, the base broad, adnate to or immersed in the fleshy rachis; style filiform. Fruit fleshy, cone-like, composed of the densely spirally arranged, connate, mature ovaries and fleshy rachis, the bracteoles persistent, and crowned by a rosette of reduced leaves. (From a native American name.)

A single variable species, native of South America, now cultivated in all tropical countries.

1. A. SATIVUS Schultz (*Ananassa sativa* Lindl.). Piña (Sp.); Pineapple.

Leaves numerous, linear-lanceolate, 1 to 1.5 m long, 5 to 7 cm wide, acuminate, the margins sharply spiny-toothed, green and shining on the upper surface, the lower surface pale beneath, those subtending the inflorescence red, at least at the base, much reduced. Stem erect, 0.5 to 1.5 m high. Heads terminal, solitary, ovoid, 6 to 8 cm long, much enlarged in fruit; bracteoles reddish, numerous, triangular-ovate to oblong-ovate, acute, imbricated. Sepals 3, ovate, thick, fleshy, about 1 cm long. Petals 3, oblanceolate, about 2 cm long, white below, violet-purple above. Mature fruit up to 20 cm long or more. (Fl. Filip. *pl. 548, Ananassa sativa.*)

Commonly cultivated, fl. Jan.–Apr.; throughout the Philippines in cultivation and in some places, at least, subspontaneous. Introduced by the Spaniards at an early date.

21. COMMELINACEAE (SPIDERWORT OR ALICBANGON FAMILY)

Herbs, sometimes suffrutescent, spreading, ascending, or sometimes climbing. Leaves entire, more or less succulent, parallel-veined, sheathing at the base. Inflorescence fascicled, cymose, or paniculate, axillary or terminal. Flowers perfect, irregular or nearly regular. Sepals 3, usually green, persistent or deciduous. Petals 3, white, purplish, or yellow, free or united in a tube below. Stamens 6, inserted on the base of the segments, all perfect or 2 or more reduced to staminodes, the filaments often bearded. Ovary free, superior, 2- or 3-celled; ovules 1 or few in each cell. Capsule loculicidal or indehiscent.

Genera about 26, species more than 300, tropical and subtropical, 7 genera and about 20 species in the Philippines.

1. Fertile stamens 3 or 2, staminodes or imperfect stamens 1 to 3.
    2. Flowers included in spathe-like bracts.................................. 1. *Commelina*
    2. Flowers panicled or axillary, spathe-like bracts none........ 2. *Aneilema*

1. Fertile stamens 6.
    2. Petals free or nearly free; flowers numerous, crowded in compressed, spathe-like, axillary bracts; ovary-cells 1-ovuled; cultivated only. 3. *Rhoeo*
    2. Petals more or less united into a tube.
        3. Sepals free or united only at the base; inflorescence 1- to several-flowered, from imbricating bracts; leaves green............ 4. *Cyanotis*
        3. Sepals united into a tube; flowers beteween the two terminal leaves, not bracteate; leaves green and purple with paler stripes. 5. *Zebrina*

6. Tradesc

1. COMMELINA Linnaeus

Usually slender herbs, the stems more or less branched, succulent, prostrate and rooting below. Flowers blue, in usually 2-flowered cymes, emerging one at a time from a terminal, complicate, compressed-funnel-shaped, or hooded spathe, the fruiting pedicel and capsule retracted within the spathe. Sepals 3, thin. Petals larger than the sepals, clawed, blue. Stamens 3 perfect and 2 or 3 imperfect; anthers oblong, one usually larger than the others. Capsule loculicidal. (In honor of K. Commelin, a Dutch botanist.)

Species about 90, all tropical and subtropical, 2 in the Philippines.

Spathes complicate, margins free or nearly so; leaves lanceolate or oblong-lanceolate.. 1. *C. nudiflora*
Spathes funnel-shaped, margins more or less united; leaves elliptic-ovate 2. *C. benghalensis*

1. C. nudiflora L. Alicbangon (Tag.).

A prostrate, spreading, branched, glabrous or nearly glabrous plant, the stems rooting at the nodes, the ultimate branches ascending. Leaves oblong-lanceolate, acuminate, 3 to 7 cm long, 1 to 2 cm wide. Inflorescence axillary, peduncled, the flowers cymose, inclosed in a complicate leaf-like spathe, the margins free, the cymes usually 2 in each spathe, few-flowered. Inner petals larger, blue, 6 to 7 mm long, the outer ones much smaller, pale or nearly white.

In open waste places, common, fl. all the year; widely distributed in the Philippines. In most tropical and subtropical countries.

2. C. benghalensis L. Alicbangon (Tag.).

A prostrate or ascending, branched, usually pubescent plant, the stems rooting at the nodes. Leaves elliptic-ovate, obtuse or acute, base narrowed into a petiole, 4 to 7 cm long. Spathes 1 to 3 together, green, funnel-shaped, compressed, about 1.5 cm long and wide. Flowers blue, long-pedicelled in anthesis, facicled, several in each spathe, the petals 3 to 4 mm long. Capsules 4 to 5 mm long. (Fl. Filip. *pl. 13.*)

In open waste places, fl. all the year; throughout the Philippines. Tropical Asia, Africa, and Malaya.

Cleistogamous flowers are usually produced at the lower nodes, ripening the capsules on the surface of or below the ground.

2. ANEILEMA R. Brown

Simple or branched, prostrate, ascending, or erect herbs. Flowers purplish or yellow, in axillary and terminal panicles, the bracts not spathe-like. Sepals 3, free, thin. Petals 3, obovate, equal. Stamens usually 3, rarely 2, the filaments glabrous or bearded; staminodes 2 to 4. Ovary sessile. Capsule loculicidal, cells 1- to several-seeded. (In allusion to the flowers not having a spathe.)

Species about 60, chiefly in tropical Asia, about 5 in the Philippines.

Flowers pale-purplish.. 1. *A. malabaricum*
Flowers russet- or yellowish-brown.. 2. *A. versicolor*

1. A. malabaricum (L.) Merr. (*A. nudiflorum* R. Br.).

A rather slender, nearly glabrous plant, branched and decumbent below, the flowering stems erect or ascending, 10 to 30 cm high. Leaves narrowly oblong-lanceolate, 3 to 10 cm long, 5 to 10 mm wide. Inflorescence terminal, the flowers racemosely clustered near the ends of the few branches. Flowers pink-purple, small, numerous, about 6 mm in diameter. Capsule ovoid, about 3 mm long. (Fl. Filip. *pl. 467.*)

In open grasslands, waste places, etc., common, fl. all the year; throughout the Philippines. India to China, and Malaya.

2. **A. versicolor** Dalz.

A succulent, spreading, branched plant, the stems 10 to 40 cm long, often ascending, glabrous or sparingly hairy. Leaves ovate to oblong-ovate, 1 to 4 cm long, base broad and cordate, somewhat clasping the stems, the sheaths usually short, hairy. Flowers solitary or in pairs, in the upper axils, their pedicles 1.5 to 2 cm long. Sepals green, oblong-elliptic, obtuse, 4 to 5 mm long. Petals orbicular-ovate to broadly elliptic, 5 to 6 mm long, yellowish- or russet-brown, turning purple in drying. Filaments clothed with weak yellowish-brown hairs. Capsule oblong, 5 mm long, inclosed by the sepals. Capsule about 4 mm long, the seeds 1-seriate, pitted.

In open wet grasslands, Caloocan to Masambong, etc., fl. Oct.–Dec.; very local in the Philippines. India.

3. RHOEO Hance

A stout, erect or ascending, unbranched herb. Leaves large, alternate, base sheathing. Peduncles axillary, short, terminated by 2, large, compressed, somewhat boat-shaped, subopposite bracts that inclose the inflorescence. Flowers very numerous, congested, their pedicels with sheathing basal bracteoles. Sepals 3, free, petaloid. Petals 3, free. Stamens 6, all fertile; filaments bearded. Ovary sessile, ovoid, 3-celled, the cells 1-ovuled. Capsule 3- or 2-celled, loculicidally dehiscent.

A monotypic American genus, with us only cultivated and not spontaneous.

*1. R. DISCOLOR (L'Hér.) Hance.

A stout, perennial, herbaceous, somewhat fleshy plant 0.5 m high or less, the stem thick, unbranched. Leaves lanceolate, acuminate, 30 to 40 cm long, 4 to 6 cm wide, fleshy, the upper surface dark-green, the lower purple. Inflorescence axillary, short-peduncled, the flowers surrounded by two, large, imbricate, laterally compressed, distichous, 3 to 4 cm long, purplish bracts. Flowers numerous in each inflorescence, fascicled, white, about 1 cm in diameter. (Fl. Filip. pl. 84, *Tradescantia discolor.*)

Cultivated for ornamental purposes, fl. most of the year. A native of tropical America.

4. CYANOTIS Don

Prostrate or ascending, usually branched herbs. Flowers in axillary and terminal cymes formed of large, imbricated, leafy, biseriate, falcate bracteoles, or in axillary clusters with small bracts. Sepals unequal, free or connate below. Petals 3, subequal. Stamens 6, all perfect, the filaments usually bearded. Ovary 3-celled, cells 2-ovuled. Capsule 3-celled, loculicidal. (Greek "blue" and "ear" from the color and form of the petals.)

Species about 35 in the tropics of the Old World, 4 or 5 in the Philippines.

Flowers solitary, terminal.. 1. *C. moluccana*
Flowers enclosed in large, biseriate, falcate, imbricate bracteoles. 2. *C. cristata*
Flowers fascicled in the leaf-axils, the bracteoles small, not imbricate and not enclosing the flowers.. 3. *C. axillaris*

1. **C. moluccana** (Roxb.) Merr. (*C. uniflora* Hassk.).

A slender, prostrate plant, the stems branched, rooting at the nodes, 10 to 30 cm in length. Leaves oblong, acute, 2 to 4 cm long, the upper surface glabrous, the lower surface often pilose, the sheaths ciliate with long, soft, brownish hairs, the leaves of the lateral branches often smaller than those on the main stem. Flowers blue, terminal, solitary, sessile or nearly so. Sepals about 4 mm long. Filaments bearded.

In damp ravines opposite Fort McKinley, fl. Oct.–Nov.; not uncommon in the Philippines. Malay Archipelago.

2. **C. cristata** (L.) Schultes f.

A succulent, prostrate, glabrous or somewhat hairy, much branched herb, the stems often purplish, rooting at the lower nodes, the branches ascending, 15 to 40 cm high. Leaves distant, ovate to ovate-oblong, sessile, fleshy, acute or obtuse, 3 to 5 cm long. Inflorescence enclosed in a series of 2-seriate, falcate, imbricate bracteoles, about one flower opening at a time, the bracteoles crowded, 1 to 1.5 cm long. Sepals lanceolate, green, hairy, 4 to 5 mm long. Corolla blue, 8 mm long, the filaments prominently bearded with blue hairs above. (Fl. Filip. *pl. 83.*)

In open waste places, occasional, fl. Sept.–Feb.; throughout the Philippines. Tropical Africa, Asia, and Malaya.

3. **C. axillaris** (L.) R. & S.

A succulent, prostrate, somewhat branched, glabrous plant, the stems about 5 mm thick, 20 to 40 cm long, rooting at the nodes. Leaves lanceolate, 4 to 11 cm long, 6 to 12 mm wide. Flowers several in each leaf-axil, only one opening at a time, the bracteoles small, not imbricating. Calyx pale-greenish. Corolla purplish, the petals long-clawed, limb 5 to 6 mm long.

In open waste places, cultivated lands, etc., fl. all the year; throughout the Philippines. India to China, Malaya, and Australia.

5. **ZEBRINA** Schnizlein

Decumbent, spreading or pendulous, branched herbs, slightly pilose. Leaves oblong to ovate, variegated, base sheating. Flowers several to many, more or less crowded between the two terminal somewhat bract-like leaves. Calyx of 3 sepals connate into a cylindric tube. Petals 3, connate into a slender tube longer than the calyx, the limbs spreading, ovate to lanceolate. Stamens 6, equal, inserted on the throat of the corolla-tube. Capsule 3-celled, on a short recurved peduncle, the seeds 1 or 2 in each cell. (From the striped leaves.)

Species 2 or 3 in Texas and Mexico, 1 widely cultivated, introduced in the Philippines.

1. Z. PENDULA Schnizl. Wandering Jew.

Stems rather slender, branched, spreading or pendulous, up to 1 m long, glabrous or somewhat hairy on one side. Leaves elliptic-ovate to oblong-ovate, acute, 3 to 9 cm long, the upper surface with grayish-green and purple longitudinal stripes, the lower surface purple, base sheathing, villous. Flowers glomerate between the 2 terminal, somewhat bract-like leaves. Calyx about 6 mm long. Corolla-tube very slender, nearly 1 cm long, the lobes oblong, pink-purple, 6 to 7 mm long.

Cultivated, fl. at intervals; occasionally escaped from cultivation in Manila, and naturalized in some provinces. A native of Mexico, now widely cultivated, but apparently of comparatively recent introduction in the Philippines.

22. PONTEDERIACEAE (PONDWEED FAMILY)

Subaquatic or marsh herbs, quite glabrous. Leaves erect, the nerves parallel or subparallel. Flowers perfect, in spikes or racemes from the sheath of the uppermost leaf, bracts sheathing, irregular. Perianth unequally 6-partite, blue, marcescent. Stamens 1 to 6, inserted at the base of the perianth-lobes; anthers erect or versatile, one longer than the others. Ovary free, 3-celled, many-ovuled; style slender; stigma subentire or lobed. Fruit a membranaceous, loculicidally 3-valved capsule. Seeds small, albumen horny or flower-like.

Genera 5, species about 21 in all warm and tropical countries, represented in the Philippines by the following genus only.

1. MONOCHORIA Presl

Characters of the Family as given above. (Greek "one" and "to separate," allusion to one stamen being longer than the others.)

Species about 6, tropics of the Old World, 2 in the Philippines.

Leaves hastate, the basal lobes spreading, oblong-ovate, the blades up to 60 cm long; lower pedicels 1.5 to 2.5 cm long, the upper ones much shorter.. 1. *M. hastata*

Leaves cordate, the basal lobes very broad, not spreading, the pedicels less than 1 cm long.. 2. *M. vaginalis*

1. M. hastata (L.) Solms. Calaboa (Tag.).

Leaves long-petioled, the petioles stout, up to 60 cm long, sheathing below, the blade broadly ovate, coriaceous, 10 to 30 cm long, slightly acuminate, base prominently hastate, the sinus very broad, the lobes spreading, oblong-ovate. Inflorescence many-flowered, 4 to 5 cm long, spicate. Flowers blue, about 1 cm long, the lower ones with elongated pedicels.

In shallow stagnant water, fl. most of the year; throughout the Philippines. India to southern China and Malaya.

2. M. vaginalis (L.) Presl. Calaboa (Tag.).

Smaller than the preceding, the petioles usually less than 30 cm in length. Leaves broadly ovate to ovate or oblong-ovate, sharply acuminate, base cordate, the lobes very broad, rounded, not spreading, or base even rounded, 6 to 10 cm long. Inflorescence spicate, 3 to 6 cm long, few-flowered. Flowers blue, about 1 cm long, their pedicels all less than 1 cm long, and of about the same length. (Fl. Filip. *pl. 466.*)

In open wet grass lands, marshy, places, etc., fl. most of the year; throughout the Philippines. India to southern China and Malaya.

23. LILIACEAE (LILY FAMILY)

Herbs with fibrous roots or from rootstocks, bulbs, or corms, sometimes shrubby and tree-like, or climbing and armed with prickles or spines. Leaves various. Flowers perfect or sometimes unisexual. Perianth thin or petaloid, 6-merous, in 2 series, rarely 8- or 10-merous, imbricate in bud. Stamens 6, rarely 3 or fewer, the filaments free or connate. Anthers oblong to linear, often versatile. Ovary superior, 3-celled; ovules 2 to many in the inner angles of the cells. Fruit a 3-, rarely 1-celled, 1- to many-seeded capsule or a berry.

Genera 215, species about 2,500, in all parts of the world, 15 genera and about 25 species in the Philippines.

1. Prickly tendril-bearing vines, with 3- to 5-nerved leaves, the flowers small, in axillary umbels........ 1. *Smilax*
1. Herbs or shrubby plants without tendrils, usually erect and unarmed.
    2. Leaves replaced by linear or acicular cladodes........ 2. *Asparagus*
    2. Leaves present, broad, linear, or cylindric.
        3. Stemless herbs.
            4. Strong-scented herbs from underground bulbs, with narrow or cylindric leaves; flowers umbellate........ 3. *Allium*
            4. Rootstock stoloniferous; leaves broad, flat, fleshy; flowers racemose........ 4. *Sansevieria*
        3. Shrubby plants.
            5. Leaves thin, colored, long-petioled........ 5. *Cordyline*
            5. Leaves rigid, sessile, tipped with a sharp spine........ 6. *Yucca*

1. SMILAX Linnaeus

Climbing, prickly, more or less woody vines. Leaves alternate, 3- to 7-nerved, reticulate with cross-veinlets, the petiole usually bearing 2 tendrils above the base. Flowers small, dioecious, in axillary, peduncled umbels, the perianth-segments 6, free. Male flowers with 6 or more free stamens. Female flowers with 3 or 6 staminodes. Ovary 3-angled, 3-celled; ovules 1 or 2 in each cell. Fruit a globose, 1- to 3-seeded berry. (The Greek name of the yew.)

Species about 200 in temperate and tropical regions of both hemispheres, about 7 in the Philippines.

1. **S. bracteata** Presl. Obat, Camagsa-obat; Hampas-tigbalang (Tag.); Banag (Vis.).

A woody vine reaching a height of several meters, the stems armed with few to many stout spines. Leaves elliptic to oblong-ovate, 7-nerved, 8 to 13 cm long, base broadly rounded or slightly cordate, apex shortly and abruptly acuminate, of about the same color on both surfaces. Umbels many-flowered, about 2 cm in diameter, in axillary racemes. Flowers greenish-yellow, about 5 mm long, fragrant. Berries globose, 5 to 8 mm in diameter, black when mature.

In thickets, Masambong, fl. May–June; widely distributed in the Philippines. Endemic.

2. ASPARAGUS Linnaeus

Erect, climbing or straggling, herbaceous plants from stout, creeping, or sometimes tuberiferous rootstocks, the stems round, grooved, or angled. Leaves reduced to minute scales, bearing in their axils tufts of needle-like or flattened, green branchlets (cladodes). Flowers small axillary, solitary, fascicled, or racemed, their pedicels jointed. Perianth campanulate, 6-parted. Stamens inserted on the bases of the segments. Ovary 3-angled, 3-celled, cells with 2 or more ovules. Fruit a small, globose, 3- to 6-seeded berry. (The ancient Greek name.)

Species about 100, in Europe and temperate and tropical Asia and Africa, one indigenous and several introduced species in the Philippines.

1. Flowers racemose; stems spiny; "leaves" (cladodes) narrow, flattened. 1. *A. spengeri*
1. Flowers solitary or fascicled; "leaves" (cladodes) setaceous.
  2. Erect, unarmed, the branches verticillately spreading; "leaves" (cladodes) 5 to 15 mm long........ 2. *A. officinalis*
  2. Climbing or ascending, branches and branchlets horizontally spreading; "leaves" (cladodes) 5 mm long or less........ 3. *A. plumosus*

***1. A. SPRENGERI Regel.**

Stems straggling or pendulous, round, striate, the branchlets subtended by slender sharp spines 0.5 cm long or less. Cladodes (branchlets) tufted, flattened, linear, straight or curved, 1 to 1.5 cm, long. Racemes axillary, spreading, 2 to 5 cm long. Flowers white, somewhat fragrant, about 5 mm in diameter, the anthers orange-yellow. Fruits globose, red, fleshy, about 8 mm in diameter, containing about 2 seeds.

Quite common in cultivation as an ornamental plant, flowering and fruiting freely. A plant of recent introduction, a native of South Africa.

***2. A. OFFICINALIS L.** Espárrago (Sp.); Asparagus.

An erect, unarmed, branched herb 2 m high, or here usually much less, the stem and branches green. Leaves (scales) very minute, the cladodes (branchlets) fascicled, slender terete, 0.5 to 1.5 cm long. Flowers axillary, fascicled, solitary or in pairs, pedicelled, the perianth straw-yellow, or greenish-yellow, about 5 mm long. Fruit globose, fleshy, red.

Cultivated for ornamental purposes and by Chinese gardeners for the local market, fl. most of the year. A native of Europe, now cultivated in all temperate and subtemperate regions.

***3. A. PLUMOSUS Baker.**

A slender, climbing or ascending, branched perennial, the stems round, green, the branches and branchlets very numerous, slender, spreading horizontally forming fern-like sprays, the upper internodes 1 to 2 mm long. Cladodes setaceous, very slender, 3 to 5 mm long, ascending or spreading, 6 to 12 in a fascicle. Flowers small, perfect, solitary at the ends of the branches, the pedicels very short, about 1 mm long. Perianth-segments about 2 mm long, spreading.

Cultivated for ornamental purposes, of recent introduction here. A native of South Africa, now cultivated in most warm countries.

3. ALLIUM Linnaeus

Rank-scented herbs from underground tunicated bulbs, the leaves narrow, flat or cylindric, the flowers capitate or umbelled at the apex of an erect scape, all at first enclosed by 1 to 3 thin sheaths. Perianth-segments 6, free or united below, usually spreading. Stamens hypogynous or inserted on the perianth, the filaments free or connate below. Ovary 3-angled, 3-celled; cells few-ovuled. Fruit a small loculicidal capsule. (Ancient Latin name of the garlic.)

Species about 250 in all parts of the North Temperate zone, a few introduced and cultivated in the Philippines.

Leaves cylindric, inflated........ 1. *A. cepa*
Leaves flat........ 2. *A. porrum*

*1. A. CEPA L. Cebolla (Sp.); Sebuyas (Tag.); Onion.

Leaves shorter than the scape, cylindric, hollow, 8 mm in diameter or less, narrowed upward to the slender apex. Scape inflated, usually about 30 cm high, about 1 cm thick in the middle, narrowed at both ends. Flowers very numerous in a dense globose umbel, the pedicels 5 to 7 mm long. Perianth-segments oblong, acuminate, 5 to 6 mm long, white or nearly so. Filaments longer than the petals. (Fl. Filip. *pl. 87*, *A. tricoccum.*)

Cultivated by Chinese gardeners at all seasons for the Manila market. Cultivated in all warm countries; a native of Europe.

*2. A. PORRUM L. Cuchai (Tag.); Puerro (Sp.); Leek.

A rank-scented, bulbous, glabrous plant. Leaves flat, fleshy, 20 cm long or more, about 5 mm wide. Scapes very sligthly compressed, slender, solid. Umbels many-flowered, 3 to 4 cm in diameter. Flowers white, fragrant, about 1 cm in diameter.

Cultivated by Chinese gardeners for the Manila market, occasionally flowering. A native of the Mediterranean region, now cultivated in most warm countries.

In addition to the above the garlic (Sp. *Ajo;* Tag., Vis., *Bauang*=*Allium sativum* L.) is extensively cultivated in some parts of the Philippines, but I have seen no growing specimens in our area.

Cordyline Royen ex Adans. = [4. SANSEVIERIA Thunberg]

Rootstock short, often stoloniferous. Leaves numerous, narrow, erect, fleshy, flat, nerveless, often mottled. Scape erect, stout, racemose, the flowers in alternate fascicles. Perianth-tube long, slender, the lobes narrow. Stamens 6, inserted at the base of the perianth-lobes; anthers dorsifixed. Ovary superior, 3-celled; style slender; stigma simple; ovules 1 in each cell. Fruit membranaceous, dehiscent. (In honor of R. de Sangro, Prince of Sanseviero.)

Species about 10 in tropical Asia and Africa, a single introduced one in the Philippines.

Cordyline roxburghiana (Schultes) Merr.

1. S. ZEYLANICA (L.) Willd. Buntot-tigre (Tag.); Bowstring Hemp.

Leaves erect, fleshy, flat, acuminate, dark-green mottled with gray, glabrous, 0.4 to 1.5 m high, 4 to 7 cm wide, base somewhat narrowed. Scape erect, up to 80 cm high. Flowers numerous, pale-straw-colored, usually tinged with green, 2.5 to 3 cm long, slender; the perianth segments nearly twice as long as the tube. (Fl. Filip. *pl. 422.*)

Frequently cultivated, and occasionally subspontaneous, fl. Dec.–Feb.; widely distributed in the Philippines in and about towns. A native of tropical Africa, now found in many other tropical countries.

etsia Medicus = [5. CORDYLINE Commerson]

Erect, simple or sparingly branched shrubs with elongated, alternate, petioled, costate, many-nerved leaves somewhat crowded toward the ends of the stems. Inflorescence terminal, paniculate, the flowers racemosely arranged on the long slender branches. Perianth tubular, 6-cleft, the lobes narrow. Stamens 6. Ovary 3-celled, cells, 4- to 16-ovuled. Fruit a usually 1-seeded berry. (Greek "club.")

Species about 10, Malaya to Australia and Polynesia, 1 in Brazil, a single introduced one in the Philippines.

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1. C. TERMINALIS (L.) Kunth. Baston, Baston de San Jose (Sp. Fil.); Saguilala, Toncodpari (Tag.).

An erect, shrubby, glabrous plant 1 to 3 m high from tuberous roots, the stems simple or somewhat branched, marked with leaf-scars. Leaves lanceolate to oblanceolate, usually tinged with red or purple, 30 to 50 cm long, mostly near the apex of the stem, acuminate, base narrowed, the nerves very numerous, slender, diverging from the midrib. Panicle terminal, purplish, laxly branched, the branches up to 30 cm in length, slender, the pedicels very short. Flowers pink, about 1 cm long, slender, tubular, the perianth split to the middle into 6 equal lobes. Berry globose, about 5 mm in diameter, few- or 1-seeded. (Fl. Filip. *pl. 98, Dracaena terminalis.*)

Commonly cultivated for its ornamental foliage, fl. Dec.–Feb.; common in and about towns in the Philippines, but certainly introduced. India to Polynesia, but frequently only in cultivation.

6. YUCCA Linnaeus

Shrubby, erect, simple or branched plants with stout thickened stems. Leaves alternate, crowded, numerous, narrow, sessile, with a sharp rigid point, the margins entire or denticulate. Flowers numerous, in terminal racemes or panicles, usually white. Perianth pendulous or drooping, subglobose to campanulate, the segments distinct or slightly united at the base. Stamens 6, hypogynous; filaments shorter than the perianth, enlarged above. Ovary 3-celled, rarely with 1 or 6 cells. Ovules 2 to several in each cell. Fruit berry-like and indehiscent, or a loculicidal capsule. (The Indian (American) name of *Manihot,* erroneously applied here.)

Species about 20 in the warmer parts of America, 1 or 2 introduced in the Philippines.

* 1. Y. ALOIFOLIA L.

Stem stout, cylindric, marked with leaf-scars, 1 to 2 m high usually sparingly branched above. Leaves very numerous, stiff, spreading above, the older and lower ones deflexed, falling from the lower part of the stem, 30 to 70 cm long, about 3 cm wide, the apex with a sharp, rigid point, constricted below the middle, the base slightly dilated, margins finely scabrid-denticulate. Panicles conical, ample, many-flowered, 30 to 50 cm long. Flowers white, about 5 cm long.

Occasionally cultivated, rarely flowering here. A native of tropical America, now cultivated in many other warm countries.

24. AMARYLLIDACEAE (AMARYLLIS OR MAGUEY FAMILY)

Slender or coarse herbs from bulbous, tuberous, or corm-like rootstocks, the leaves radical, narrow or broad, sessile or pedicelled, the scape naked or leafy. Perianth superior, regular or irregular, the tube long, short, or none, 6-lobed or 6-parted, sometimes with a crown at the mouth. Stamens 6, inserted on the segments, the filaments free or connate; anthers erect or versatile. Ovary inferior, 3-celled; ovules many, 2-seriate. Fruit capsular, loculicidal, rarely fleshy and bursting irregularly.

Genera 80, species about 800, in all warm countries, 11 genera and about 15 species in the Philippines, mostly introduced.

1. Inflorescence spicate or panicled.
  2. Coarse plants with thick, fleshy, spiny-toothed leaves and very large, panicled inflorescences........ 1. *Agave*
  2. Slender plants with narrow. toothless leaves and spicate flowers. 2. *Polianthes*
1. Flowers solitary or umbellate.
  2. Filaments free.
    3. Flowers solitary........ 3. *Zevhyranthes*
    3. Flowers umbellate........ 4. *Crinum*
  2. Filaments appendiculate and united at the base into a distinct cup.
    3. Flowers solitary........ 5. *Pancratium*
    3. Flowers umbellate.
      4 Leaves linear to linear-lanceolate; ovary-cells 2-ovuled. 6. *Hymenocallis*
      4. Leaves broadly ovate to suborbicular; ovary-cells 2- or 3-ovuled. 7. *Eurycles*
      4. Leaves elliptic-oblong; ovary-cells many-ovuled........ 8. *Eucharis*

1. AGAVE Linnaeus

Fleshy or somewhat woody, coarse plants, with usually very short stems. Leaves crowded on the stem, radiate, thick, fleshy, persisting for several years, sharply pointed, margins with stout spiny teeth. Inflorescence terminal, tall, stout, branched. Flowers succulent, panicled, usually greenish. Sepals and petals partly united, the lobes equal or subequal. Stamens 6; filaments more or less adnate to the perianth-tube. Ovary 3-celled; ovules numerous. Fruit a 3-celled capsule. (Greek "noble.")

Species about 140 in tropical America, 1 introduced in the Philippines.

*1. A. CANTULA Roxb. Maguey (Sp.-Fil.); Sisal Hemp, Century Plant, Stems short, stout. Leaves 20 to 50 in a dense rosette, linear-lanceolate, thick, more or less glaucous, 0.8 to 1.3 m long, up to 8 or 10 cm wide, narrowed toward both ends, apex with a sharp, horny point, margins with sharp spine-like teeth. Inflorescence erect, up to 6 m in height, stout, branched. Flowers greenish, the perianth 4 to 5 cm long; filaments exceeding the segments. (Fl. Filip. *pl. 96, A. americana.*)

Cultivated in our area for ornamental purposes, in many provinces extensively cultivated for the fiber produced by the leaves. The plants flower when several years old; bulbils are often produced in place of flowers. A native of tropical America, now introduced in many other tropical countries.

2. POLIANTHES Linnaeus

Erect, leafy, unbranched plants from tuberous rootstocks. Leaves linear, basal and scattered along the stem. Inflorescence terminal, spicate, the bracts persistent. Perianth with a long, narrowly funnel-shaped, curved tube, and short, unequal segments. Stamens inserted at the middle of the tube, not exserted. Ovary 3-celled, free at the apex; ovules many; style filiform. Fruit ovoid, crowned by the persistent perianth. (Greek "white" and "flower.")

A monotypic Mexican genus.

*1. P. TUBEROSA L. Azucena (Sp.-Fil.); Tuberose.

Rootstock stout, tuberous. Basal leaves linear, 40 to 60 cm long, less than 1 cm wide, those on the stem much shorter. Stems erect, 0.5 to 1 m high. Flowers fragrant, waxy-white, in pairs, 5 to 6 cm long, the segments oblong-lanceolate, 1 to 1.5 cm long.

Cultivated, fl. Mar.–May; a native of Mexico, now cultivated in most warm countries.

3. ZEPHYRANTHES Herbert

Stemless herbs from tunicated bulbs. Leaves basal, glabrous, the blades few; linear, flat. Scape 1-flowered. Perianth pink to purple, the tube funnel-shaped, the lobes 6, somewhat spreading. Stamens 6; filaments adnate to the throat of the perianth-tube. Ovary 3-celled; style filiform, the stigma subcapitate or 3-lobed. Capsule subglobose or depressed, 3-valved. (Greek "wind" and "flower.")

Species about 30, eastern United States to Mexico and South America, 1 introduced in the Philippines.

*** 1. Z. ROSEA Lindl.**

Bulbs ovoid, about 2 cm in diameter. Leaves all basal, fleshy, glabrous, shining, linear, up to 35 cm long, 4 to 6 mm wide. Scapes solitary, erect, green, slightly compressed, equaling or slightly longer than the leaves, 1-flowered, the spathe subtending the pedicel membranaceous, about 2 cm long, 2-cleft, the pedicel 3 to 4 cm long. Perianth light-purple, somewhat funnel-shaped, about 4 cm long, the lobes oblong-ovate, 1 to 1.5 cm wide, the inner 3 somewhat narrower than the outer ones. Anthers yellow, included. Style longer than the stamens, trifid. (Fl. Filip. *pl. 271, Habranthus versicolor.*)

Commonly cultivated as a border-plant, fl. June–Sept., and probably in other months. A native of tropical America.

4. CRINUM Linnaeus

Rootstocks bulb-like, usually large. Leaves numerous, usually broad. Peduncle solid. Flowers umbellate, white to red or purplish. Perianth-tube long, cylindric, straight or curved, the segments linear to oblong. Stamens on the throat of the perianth-tube; filaments long, slender; anthers versatile. Ovary 3-celled; ovules few in each cell; style long; stigma capitate. Fruit usually subglobose, at length dehiscent, the seeds few, large. (Greek "lily.")

Species about 80 in the tropics of both hemispheres, 2 or 3 in the Philippines.

1. Corolla salver-shaped; perianth-lobes spreading, less than 1 cm broad. 1. *C. asiaticum*

1. Corolla funnel-shaped, perianth-lobes 2 to 3 cm wide.
  2. Perianth reddish-purple........ 2. *C. zeylanicum*
  2. Perianth white, flushed with pale-purple........ 3. *C. latifolium*

1. C. asiaticum L. Bacón (Tag.).

Trunk short, stout, 10 to 15 cm in diameter, the leaves crowded at its apex, lanceolate, up to 1.2 m long, and 15 cm wide, acuminate. Scape erect, stout, solid, green, 1 m high or less, 2 to 3 cm in diameter. Spathe subtending the flowers about 15 cm long, membranaceous, split to the base. Flowers fragrant, 20 to 40, each subtended by a thin, narrow bracteole. Perianth-tube greenish, about 10 cm long, the lobes spreading, 8 cm long, about 8 mm wide, white. Filaments purplish above. Fruit subglobose, about 5 cm in diameter. (Fl. Filip. *pl. 168.*)

Cultivated for ornamental purposes, also in open places near the sea, flowering most of the year; throughout the Philippines near the sea. India to Malaya.

*2. C. ZEYLANICUM L. Lilio (Sp.-Fil.).

Stout, glabrous, the bulbs globose 10 to 15 cm in diameter. Stems stout, short, erect. Leaves up to 1 m long, 7 to 10 cm wide. Peduncles stout, about as long as the leaves, with 10 to 20 umbellately arranged, reddish, fragrant flowers. Pedicels short. Flowers long, the tube slender, about 10 cm long, the limb usually a little longer, the segments oblong-lanceolate, acute, about 2 cm wide, purplish-red, margined with white, paler inside.

Cultivated for ornamental purposes, fl. June–Aug., and probably in other months. Tropical Asia and Africa, introduced in the Philippines and not spontaneous.

*3. C. LATIFOLIUM L. Lilio (Sp.-Fil.).

Bulb subglobose, up to 10 cm or more in diameter. Leaves 60 to 100 cm long, 5 to 8 cm wide. Peduncles stout, solid, green, 2 to 2.5 cm in diameter, up to 60 cm in length. Flowers about 10 in each umbel, fragrant, sessile or shortly pedicelled, the spathe-valves thin, about 8 cm long, oblong-ovate, acute. Perianth tube 10 to 12 cm long, purplish below, greenish above, curved at the apex, 6 to 7 mm in diameter, the limb campanulate, horizontal or ascending, 10 to 12 cm long, the segments about 3 cm wide, white flushed with pale purple in the median part. Filaments white, declinate.

Occasionally cultivated, fl. June–Oct., and probably in other months; introduced from tropical Asia.

5. PANCRATIUM Linnaeus

Herbaceous, from a thick, underground bulb. Leaves few, 2-ranked, narrow. Scape from the bulb, solid. Flowers large, white, solitary (in our species). Perianth funnel-shaped, the tube elongated, the limb spreading, the lobes 6, narrow. Stamens erect, inserted on the throat of the perianth, united by a toothed or lobed membrane which forms a cup; anthers dorsifixed. Style slender; ovules many in each cell. Capsule subglobose, 3-angled, loculicidal. (Greek "all" and "strength.")

Species about 12, southern Europe, Asia, and Africa, a single introduced one in the Philippines.

*1. P. ZEYLANICUM L.

Bulb subglobose or ovoid, about 5 cm in diameter. Leaves 6 to 8, 2-ranked, linear-lanceolate, acuminate, about 25 cm long and 2 cm wide. Scape somewhat shorter than the leaves, slightly compressed. Flowers solitary, erect, white. Corolla-tube 4 to 5 cm long, the membranaceous part connecting the stamens about 5 cm in diameter, with 12 large, acuminate teeth, the perianth-lobes recurved, lanceolate, acuminate, about 5 cm long, 1 cm wide. Filaments erect, the free parts about 3 cm long. (Fl. Filip. *pl. 321.*)

Occasionally found in gardens, flowering all the year; introduced from India or Ceylon.

6. HYMENOCALLIS Salisbury

Rootstock stout, tunicated, the leaves numerous, long, sessile. Peduncle solid, erect, bearing many, white, fragrant flowers in a terminal umbel. Perianth salver-shaped, the tube cylindric, the segments linear, equal, elongated. Stamens united by a large, white cup, the free parts of the filaments filiform; anthers versatile. Ovary 3-celled; ovules 2 in each cell; style long, filiform; stigma minute. Fruit a large, bulb-like, finally dehiscent capsule. (Greek "membrane" and "beauty.")

Species about 30 in the tropical and warmer parts of America, 1 introduced in the Philippines.

*1. H. TENUIFLORA Herb.

Leaves crowded, narrowly lanceolate, fleshy, acuminate or acute, 0.5 to 1 m long, 6 to 7 cm wide. Scape erect, solid, somewhat compressed, about 0.5 m tall, bearing at its apex few to many, sessile, umbellate flowers, the spathe subtending the flowers very thin, marcescent. Flowers fragrant, the perianth-tube greenish below, whitish above, about 12 cm long, the lobes linear, white, spreading, 10 cm long, 5 to 7 mm wide. The membranaceous cup connecting the filaments white, funnel-shaped, 4 to 5 cm in diameter. Anthers erect, green. (Fl. Filip. *pl. 411, H. adnata.*)

Commonly cultivated for ornamental purposes, fl. most of the year. A native of tropical America.

7. EURYCLES Salisbury

Rootstock a tunicated bulb, the leaves broad, petioled, with lax, arcuate main-veins and oblique cross-veinlets. Flowers many, in a peduncled umbel, white. Perianth-tube cylindric, the lobes subequal, ascending, oblong-lanceolate. Stamens inserted at the throat, the filaments united in a distinct, 12-toothed, cup; anthers versatile. Ovary 3-celled, the ovules 2 or 3 in each cell; style filiform. Capsule globose, suculent.

Species 2, Malaya and Australia, 1 in the Philippines.

1. **E. amboinensis** (L.) Lindl.

Bulb 5 to 10 cm in diameter. Leaf-blade suborbicular or broadly ovate, base broadly cordate, shortly and abruptly acuminate, up to 25 cm long and wide, the petiole longer than the blade, dilated at the base, the nerves 12 to 15 on each side of the midrib. Peduncle about as long as the leaves, bearing from 15 to 30 flowers in a dense umbel. Perianth about 5 cm long, the segments as long as the tube. (Fl. Filip. *pl. 406.*)

Frequently cultivated, fl. June.–Aug., and probably in other months; of very local occurrence in the Philippines. Malay Peninsula to northern Australia.

8. EUCHARIS Planchon

Bulbs tunicated, the leaves petioled, oblong, green. Flowers large, umbellate, white, fragrant, the outer spathe-valves 2 or 3, ovate-lanceolate. Perianth-tube cylindric, slender, dilated above, the segments broad, spreading, imbricate, subequal. Stamens inserted at the throat of the perianth-tube, shorter than the segments, erect, the filaments broadly appendaged below, the appendages united into a 12-toothed cup, the free parts of the filaments stout, shorter than the appendages. Anthers versatile. Ovary globose, 3-celled; ovules many; style filiform. Fruit deeply 3-lobed, finally dehiscent. (Greek "well" or "true," and "graceful.")

Species 6 or 8, natives of Colombia, most of them in cultivation.

*1. E. GRANDIFLORA Planch. Amazon Lily.

Leaves oblong-elliptic, narrowed at both ends, acuminate, coriaceous, 25 to 35 cm long, about 15 cm wide, shining, the petioles stout, about 20 cm long. Peduncle solid, about as long as the leaves, bearing from 4 to 6, large, umbellate, white, fragrant flowers, the spathe-valves oblong-lanceolate, about 5 cm long. Flowers about 9 cm in diameter, the ovary and its stalk green, the tube slender, about 5 cm long, narrowly funnel-shaped above the middle. Perianth-lobes ovate, acute or obtuse, spreading, about 4 cm long and 3 cm wide. Appendages to the stamens greenish inside, quadrate, each 2-toothed, united into an erect cup; free parts of the filaments stout, erect.

Not uncommon in cultivation, fl. most of the year. A native of Colombia, now widely cultivated in most warm countries.

25. TACCACEAE (TACCA OR PANARIEN FAMILY)

Herbaceous plants from tuberous or creeping rootstocks, the leaves radical, lobed or laciniate. Scape erect, leafless. Flowers umbellate, subtended by leaf-like bracts. Perianth 6-lobed, superior. Stamens 6, at the base of the lobes, the filaments short, dilated or appendaged on each side, above dilated into an inflexed hood; anthers sessile within the hood. Ovary 1-celled; style short; stigmas broad, or petaloid and umbella-like. Fruit fleshy and indehiscent, or at length 3-valved. Seeds many.

A single genus of about 10 species, all tropical.

1. TACCA Linnaeus

Character of the Family. (From the local Amboyna name.)

Coarse, erect, the petioles up to 1 m in length; leaves 1 to 1.5 m in diameter, 3-partite, the segments variously lobed and toothed...... 1. *T. pinnatifida*

Slender, the leaves 15 to 20 cm in diameter, pedately 5- or 7-partite, the segments entire........................ 2. *T. palmata*

1. **T. pinnatifida** Forst. Panarien (Il.); Yabyaban (Tag.); Polynesian Arrowroot.

Rootstock tuberous, depressed-globose, up to 30 cm in diameter. Petiole often nearly 1 m long, hollow, 1.5 to 2 cm in diameter, striate. Leaves tripartite, spreading, 1 to 1.5 m in diameter, the segments 2-fid or irregularly pinnatifid or pinnate at the base, often large, irregularly lobed. Scape up to 1.4 m long, hollow, tapering, green, erect 10- to 40-flowered, flowers crowded at the apex, pedicelled, drooping, intermixed with very long, filiform bracts, subtended by from 4 to 12, oblong, acuminate, 5 to 7 cm long, involucrate leaves. Perianth green and purplish, about 1 cm long. Fruit ellipsoid, or ovoid, smooth, yellowish, 6-ribbed, 3 to 4 cm long.

In thickets, Pasay, Masambong, etc., occasional, fl. July–Aug.; widely distributed in the Philippines near the seashore. Tropical Asia and Africa, Malaya, Australia, and Polynesia. The fleshy roots are edible, the plant being cultivated in some countries.

2. **T. palmata** Bl. Payong-payongan (Tag.).

Rootstock tuberous, ovoid, small, 2 to 4 cm in diameter. Petiole slender, 20 to 30 cm long. Leaves 15 to 20 cm in diameter pedately 5- to 7-partite, thin, the segments oblong to elliptic-oblong, entire, acuminate, the lower two on each side more united than the others. Scapes slender, about as long as the leaves. Flowers umbellate, pedicelled, purple and green, about 8 mm long, the involucre usually of four leaves, the outer two broadly ovate, acuminate, nearly sessile, 3 to 6 cm long, the inner two with constricted bases, petioled. Fruit subglobose, fleshy, red, about 1 cm long.

In thickets, Pasay, Masambong, etc., fl. June–July; widely distributed in the Philippines. Malaya.

26. DIOSCOREACEAE (YAM OR UBI FAMILY)

Usually twining vines, smooth or armed, from fleshy rootstocks. Leaves simple or digitately 3- to 7-foliolate. Flowers small, in spikes, racemes, or panicles, unisexual. Male flowers: Perianth 6-lobed. Stamens inserted at the base of the perianth or on its lobes, 3 or 6, or sometimes 3 perfect and 3 staminodes. Rudimentary ovary present or wanting. Female flowers similar to the males. Staminodes 0, 3, or 6. Ovary 3-winged, 3-celled; ovules 2 in each cell. Capsules 3-valved, 3-winged. Seeds winged.

Genera 9, species about 225, of wide tropical distribution, 2 genera and 18 or more species in the Philippines.

1. DIOSCOREA Linnaeus

Characters of the Family as given above. (In honor of Dioscorides, a famous Greek physican and botanist.)

Species 150 or more, warmer parts of both hemispheres, about 15 in the Philippines.

1. Leaves simple.
    2. Stems 4-angled or 4-winged........ 1. *D. alata*
    2. Stems terete, not at all angled or winged.
        3. Unarmed, glabrous; leaves 7- or 9-nerved, ovate, slenderly acuminate. 2. *D. bulbifera*
        3. Somewhat spiny, pubescent; leaves orbicular to reniform, 11- to 15-nerved........ 3. *D. fasciculata*
1. Leaves 3-foliolate; stems spiny........ 4. *D. daemona*
1. Leaves 5- or 7-foliolate........ 5. *D. pentaphylla*

*1. D. **ALATA** L. Ubi (Tag., Il., Vis.).

A twining glabrous vine from large tuberous roots, the stems acutely 4-angled or narrowly winged, often bearing axillary bulbils. Leaves opposite, oblong-ovate, 8 to 16 cm long, 3 to 8 cm wide, sharply acuminate, base cordate, 7- to 9-nerved, the basal lobes rounded. Staminate inflorescence axillary, narrowly paniculate, up to 30 cm in length, the flowers alternate, on the short, zigzag, fasciculately and racemosely arranged spikes, greenish, 1 to 1.5 mm long.

Commonly cultivated for its edible tubers, fl. Oct.–Nov.; widely distributed in the Philippines, but certainly not indigenous. India to Malaya.

2. **D. bulbifera** L.

A glabrous, unarmed, herbaceous vine reaching a length of several meters, the stems terete. Leaves simple, 7 to 14 cm long, ovate, acuminate, base broad, prominently cordate, the sinus broad and rounded, the lobes rounded, 7- or 9-nerved. Spikes slender, panicled, numerous, 8 to 10 cm long, rather densely many-flowered, the flowers about 3 mm long. Axils often bulbiferous.

In thickets, occasional, fl. Aug.; of local occurrence in the Philippines. India to Malaya.

3. **D. fasciculata** Roxb. Tungo (Tag.); Tugue (Il.); Tamis (Vis.).

A slender somewhat pubescent vine reaching a height of several meters, the stems with scattered sharp spines. Leaves simple, suborbicular to reniform 6 to 12 cm long, apiculate, base 11- to 15-nerved, prominently cordate, lobes rounded. Spikes slender, axillary, pubescent, up to 50 cm long. Flowers green, about 4 mm in diameter.

In dry thickets, occasional, fl. June–Aug.; widely distributed in the Philippines. India.

4. **D. daemona** Roxb. Nami (Tag.); Corot (Il., Vis.).

A twining vine from tuberous roots, reaching a length of several meters, the stems with few or many, short, sharp spines. Leaves 3-foliolate, the leaflets 12 to 20 cm long, acuminate, somewhat pubescent, the lateral ones oblique, oblong-ovate, terminal one equilateral, oblong to oblong-obovate. Panicles axillary, slender, pubescent 12 to 20 cm long. Flowers small. Stamens 6. Capsules oblong, about 5 cm long.

Occasional in thickets, fl. June–July; throughout the Philippines. India to Malaya.

5. **D. pen**t**aphylla** L. Lima-lima (Tag., Vis.).

A climbing vine from stout tubers, the stems with scattered small spines. Leaflets 5 to 7, oval to oblong-lanceolate, acuminate, glabrous or nearly so, 8 to 15 cm long. Panicles axillary, pubescent, much longer than the leaves. Flowers yellowish-white, somewhat fragrant. Stamens 3, alternating with 3 staminodes. Capsules 2 to 2.5 cm long, usually rounded at both ends.

In thickets, Pasay, Masambong, etc., fl. Nov.; widely distributed in the Philippines. Tropical Africa, India and Malaya.

27. IRIDACEAE (IRIS FAMILY)

Perennial herbs from often thickened rootstocks. Leaves narrow, often distichous and equitant, sometimes plicate, sessile or petioled. Inflorescence various. Flowers in spathes, few to many, usually but 1 or 2 opening at a time. Perianth superior, petaloid, the segments 6, 2-seriate, imbricate. Stamens 3, epigynous or adnate to the outer segment; anthers extrorse. Ovary 3-celled; style simple; stigmas 3; ovules many, 2-seriate. Capsule 3-angled or cylindric, loculicidally 3-celled. Seeds many.

Genera 59, species about 1,000, chiefly in temperate regions, 3 or 4 genera and species in the Philippines, a single one indigenous.

Leaves distichous, equitant, vertical, not or obscurely nerved. 1. *Belamcanda*

Leaves not distichous or equitant, prominently nerved and plicate. 2. *Eleutherine*

1. BELAMCANDA Adanson

Erect herbs from stout rootstocks. Leaves many, ascending or erect, large, 2-ranked, lanceolate, vertical, those of the stem similar to the basal ones and gradually smaller upward. Inflorescence dichotomously corymbose, the spathes small, many-flowered, the valves many, membranaceous, the pedicels exserted, joined at the apex. Perianth rotate, nearly or quite regular, the tube not produced above the ovary. The segments oblong-oblanceolate or narrowly elliptic, clawed, spreading in flower. Stamens 3, shorter than the perianth. Ovary 3-celled; ovules many. Capsule obovoid, loculicidally 3-valved. (From the Malabar name.)

A monotypic Chinese genus, the single species introduced in the Philippines.

1. B. CHINENSIS (L.) Leman.

Erect, tufted, glabrous, 0.5 to 1.5 m. high. Leaves 2-ranked, strongly imbricated, crowded, narrowly lanceolate, acuminate, ascending, vertical, coriaceous, 40 to 60 cm long, 2.5 to 4 cm wide, those of the stem equitant.

Inflorescence terminal erect, dichotomously branched, the spathes ovate to ovate-lanceolate, about 1 cm long, many-flowered, 1 or 2 opening at a time, 5 to 6 cm in diameter, the perianth-lobes spreading narrowly-elliptic, narrowed at both ends, yellowish outside, inside reddish-yellow with darker spots. (Fl. Filip. *pl. 376, Pardanthus chinensis.*)

Cultivated in larger towns in the Philippines, sometimes spontaneous, fl. all the year. A native of China now introduced in many warm and tropical countries.

2. ELEUTHERINE Herbert

Herbs from purple, tunicated bulbs, the outer layers membranaceous. Leaves few, petioled, lanceolate, 6- or 7-nerved, plicate. Scapes as long as the leaves, flowering at the apex, the long-peduncled spathes fascicled, subtended by a lanceolate, leaf-like bract. Spathes green, oblong, up to 12 on each scape, much shorter than their peduncles, many-flowered, one flower opening at a time, the inner valves many, membranaceous, imbricate. Perianth regular, rotate, white, the tube not produced above the ovary; segments 6, obovate, the interior ones slightly smaller. Stamens 3, shorter than the perianth-limb. Ovary clavate, 3-celled, cells many-ovuled. Capsule cylindric, 6-sulcate, operculate, 3-valved at the apex. (Greek "free.")

An American genus of one or two species, 1 introduced in the Philippines.

1. E. PALMAEFOLIA (L.) Merr. (*E. plicata* Herb.).

Bulbs about 4 cm long, ovoid-oblong, narrowed at both ends, the outer layers thin, purple. Leaves lanceolate, narrowed at both ends, plicate, 3 or 4 from each bulb, 30 to 50 cm long, 1.5 to 3 cm wide. Scapes rather slender, as long as the leaves, green. Spathes 10 to 12 mm long, the outer two green, the inner ones very much thinner, greenish-white. Flowers white, about 2 cm in diameter, the lobes obovate, spreading. (Fl. Filip. *pl. 100, Antholyza meriana.*)

Occasionally cultivated, fl. May–July, and probably in other months; in and about some towns in the Philippines, sometimes spontaneous. Introduced from tropical America at an early date.

28. MUSACEAE (BANANA OR SAGUING FAMILY)

Stems erect, tree-like with the leaves all at the top, or formed of the fleshy, convulute, closely imbricate, leaf-sheaths. Leaves very large, oblong, distichous or spirally arranged. Inflorescence simple or compound, bracteate. Flowers sessile or pedicelled, ebracteolate or with small bracteoles, perfect or monoecious. Petals free or connate, the corolla often inflated and surrounding the anthers and style. Stamens 5, free; staminode 1 or none. Ovary inferior, 3-celled; ovules 1 to many in each cell. Fruit fleshy and baccate, or a dehiscent capsule.

Genera 6, species more than 100, in the tropics of both hemispheres, 1 indigenous genus with a number of distinct species, and several introduced ones in the Philippines.

Leaves spirally arranged, their sheaths closely imbricated forming a cylindric fleshy trunk.. 1. *Musa*
Leaves distichous, radiately arranged in one plane like a fan at the apex of the trunk.. 2. *Ravenala*

1. MUSA Linnaeus

Very coarse herbaceous plants from usually perennial rootstocks. Trunks erect, soft, formed of the thickened, closely imbricate leaf-sheaths. Leaves very large, oblong, the midrib prominent, the blade penninerved. Inflorescence terminal in an erect or reflexed bracteate spike, the lower flowers female with imperfect stamens, the upper ones male, the intermediate ones often perfect. Flowers crowded in the axils of large, ovate, persistent or deciduous bracts. Calyx slit down one side to the base, 3- to 5-lobed at the apex. Corolla equalling or shorter than the calyx, concave, inflated, thin, more or less surrounding the stamens and style. Perfect stamens 5, the sixth rudimentary or wanting; filaments stout; anthers linear, erect, 2-celled. Ovary 3-celled, many-ovuled. Fruit fleshy, indehiscent, elongated, cylindric or angled, the pericarp tough; seeds subglobose, in many cultivated forms wanting. (Named after Musa, physician to Augustus.)

Species 50 or more with many varieties, in the tropics of both hemispheres, the Philippine forms not well understood.

1. M. PARADISIACA L. Saguing (Tag.); Banana.

Rootstock stout, stoloniferous, the stem stout, erect, 1.5 to 3.5 m high. Leaves up to 2 m in length. Spike recurved, stout, much shorter than the leaves, the bracts large, dull-purplish, deciduous. Flowers about 7 cm long, the calyx about twice as long as the much inflated corolla. Fruit exceedingly variable, 10 to 20 cm long, cylindric or angled, the pericarp thick or rather thin, seedless or with numerous seeds. (Fl. Filip. *pl. 88, 89.*)

Very commonly cultivated, fl. all the year; throughout the Philippines, probably of prehistoric introduction here, at least many of the forms or varieties, others of more recent introduction. Cultivated in all tropical countries.

The banana has numerous varieties, the distinguishing characters being chiefly in the fruits. Commonly among the natives *saguing* is the name for all bananas, but the Spanish name *platano* or *plantano* is much used to designate those forms especially used for food after being cooked, and *banana* for the forms used for food without cooking.

Blanco in 1837 states that there were then 57 varieties known in the Archipelago. The various varieties have distinctive names, the chief forms found in Manila being enumerated below.

Sabá, Bisco, or *Obispo;* the most common form in cultivation in Manila, the fruit with a thick skin, yellow when mature, about 10 cm long, prominently 3-angled; pulp somewhat fibrous, acid, with or without seeds. *Buñgulan;* fruit elongated, cylindric and green when mature, up to 20 cm in length, the pulp soft with a very delicate flavor. *Gloria* or *Ternate;* fruit angular, yellow, stout, up to 15 cm or more in length, well-flavored. *Letondal;* fruit stout, cylindric, about 10 cm long, the skin thin, yellow, the pulp pale, subacid, the most common banana in the Manila markets. *Lacatan;* fruit cylindric or slightly angled when mature, about 15 cm long, yellow, the pulp firm, with a delicate flavor. *Morado,* fruit stout, usually angled when mature, up to 15 cm long, the skin tough, brownish-purple, the pulp firm, well-flavored. Other forms are occasionally found:

Musa textilis Née, the well-known *abacá* plant, an endemic species yielding the fiber known as abacá or Manila hemp is represented by few specimens in cultivation in Singalon. The very large *Musa superba* Roxb., a nonstoloniferous species, native of India, has been cultivated in Manila for ornamental purposes, but has not persisted. *Musa coccinea* Andr. of southern China, a small slender species with erect inflorescence and few-flowered red bracts has also been introduced and cultivated for ornament, but has not persisted in Manila.

2. RAVENALA Adanson

Tall trees, with cylindric trunks, the leaves large, oblong, long-petioled, distichous, disposed in one plane in the form of a fan at the top of the trunk. Inflorescence axillary, distichous, compound, bracteate, the bracts spathe-like, many flowered. Flowers perfect. Sepals 3, free, long, narrow, acuminate. Petals 3, the exterior one shorter than the others, narrow, the lateral two similar to the sepals. Stamens 5, slightly shorter than the petals. Ovary 3-celled, many-ovuled. Capsule ovoid, somewhat 3-angled, 3-valved. (From its native Madagascar name.)

Species 2, one in Madagascar and 1 in tropical South America, the former now widely distributed in cultivation.

*1. R. MADAGASCARIENSIS Sonn. Traveller's Tree.

Trunk erect, cylindric, woody, marked with scars of fallen leaves, up to 10 m in height. Leaves oblong, the blades 1.5 to 3 m long, shorter than the petioles, the petioles stout, imbricated in one plane. Inflorescence in the leaf-axils, about 12 spathes or bracts in each inflorescence. Flowers yellow.

Not uncommon in cultivation, introduced, rarely flowering here. Its common English name is derived from the fact that travelers in Madagascar secure good drinking water from the large cells of the petioles.

Other representatives of this family, such as *Strelitzia reginae* Banks from South Africa, and one or two species of *Heliconia* from tropical America, are of such recent introduction here that they are at present very rare in gardens and have not been included.

29. ZINGIBERACEAE [1] (GINGER OR LUYA FAMILY)

Slender or coarse, often aromatic herbs from fleshy rootstocks, the stems simple. Leaves simple, radical or cauline, usually distichous, sometimes spirally arranged, small to large, closely pinnately veined from the midrib, the sheaths usually present, ligule present or absent. Flowers small to large, irregular, perfect, solitary, spicate, racemose, or panicled, often in dense cone-like heads, bracts and often bracteoles present. Calyx tubular or spathe-like, 3-toothed or lobed, produced above the ovary. Corolla-tube long or short, the limb 3-partite. Perfect stamen 1, one or more petaloid staminodes usually present, the staminodes often large and showy, sometimes small and inconspicuous or wanting. Ovary inferior, 1- to 3-celled; style usually slender; ovules many. Fruit a loculicidally 3-valved, membranaceous, coriaceous, or fleshy capsule, sometimes indehiscent, crowned by the remains of the perianth. Seeds numerous, arillate or not, small.

Genera about 45, species over 800, in the tropics of both hemispheres, about 16 genera and 65 species in the Philippines.

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[1] For a consideration of the Philippine species see Ridley, H. N., "The Scitamineae of the Philippines." *Philip. Journ. Sci.* 4 (1909) *Bot.* 155–199.

1. Staminodes 2, broad and petal-like.
  2. Inflorescence terminating the leafy stem.
    3. Filament long, slender, longer than the corolla; stems elongated, leafy.
      4. Lip adnate to the filament above the corolla; ovary 1-celled. 1. *Globba*
      4. Lip free; ovary 3-celled.. 2. *Hedychium*
    3. Filament shorter than the corolla; leaves radical, usually only 2. 3. *Kaempferia*
  2. Inflorescence cone-like, cylindric, dense, spicate, peduncled, arising from the rootstock.. 4. *Curcuma*
1. Staminodes small or none.
  2. Leaves arranged in two ranks; sheaths split.
    3. Inflorescence peduncled, dense and cone-like, arising from the rootstock.. 5. *Zingiber*
    3. Inflorescence terminating the leafy stem; panicle branches covered with persistent, oblong, closely appressed bracts...... 6. *Kolowratia*
  2. Leaves spirally arranged; sheaths united.. 7. *Costus*

1. GLOBBA Linnaeus

Usually slender erect herbs with leafy stems, from short rootstocks, the leaves distichous, ovate to lanceolate, basal part sheathing the stem, ligulate. Inflorescence terminal, dense and spicate or racemose, or more lax and paniculate. Flowers small, yellow or white. Calyx tubular, 3-toothed, regular or irregular. Corolla-tube slender, longer than the calyx, 3-lobed, the lobes boat-shaped, deflexed. Staminodes similar to the lobes. Base of the lip adnate by its edges to the stamen, forming a tube below, its limb free, narrow, elongated, deflexed, usually 2-lobed. Filament elongated, erect, slender. Connective of the anther extended laterally into an entire margin, or sometimes with 2 or 4 triangular spurs. Ovary 1-celled. Capsule globose, smooth or verrucose, fleshy, dehiscing irregularly. (From its Amboynese name "galoba.")

Species about 75, tropical Asia to New Guinea, about 10 in the Philippines.

1. G. MARANTINA L.

Erect, glabrous or sparingly pilose, 25 to 60 cm high, from slender rootstocks. Stems rather loosely covered with sheaths. Leaves ovate to elliptic or lanceolate, acuminate, 8 to 15 cm long. Inflorescence dense, spike-like, 2 to 8 cm long, the bracts persistent, ovate, green, gland-dotted, ciliate on the edges, 1 to 2 cm long, frequently containing ellipsoid to conic bulbils in place of flowers. Flowers yellow, slender, about 5 cm long. Calyx tubular, 3-toothed. Corolla-tube much longer than the calyx, glandular-dotted. Lip short, oblong, cuneate, widely retuse. Anther-spurs 4, triangular, equal. (Fl. Filip. *pl. 351.*)

In thickets, Masambong to Pasig and Pasay, fl. June–Sept.; widely distributed about towns in the Philippines, certainly introduced. Amboyna and Celebes to New Guinea, a weed of cultivation in Java, Singapore, etc.

2. HEDYCHIUM Koenig

Terrestial erect herbs with elongated leafy stems from stout rootstocks. Leaves distichous, sessile or shortly petioled, ligulate, oblong to linear-oblong or lanceolate, acuminate. Inflorescence a terminal, usually dense, bracteate spike, the bracts oblong to obovate or lanceolate, usually imbricate, persistent, each with from one to several flowers. Calyx tubular and 3-toothed, sometimes split down one side, much shorter than the very slender corolla-tube. Corolla-lobes linear, spreading or reflexed. Staminodes broad and petaloid, often much wider than the petals. Lip large, often suborbicular, 2-lobed at the apex, usually much larger than the petals and staminodes. Filament elongated. Ovary 3-celled. Capsule 3-valved, globose to oblong. Seeds numerous, small, arillate. (Greek "sweet" and "snow," in allusion to the fragrant white flowers.)

Species about 40, India to Malaya, 2 in the Philippines.

1. **H. CORONARIUM** Koenig. Camia (Sp.-Fil.).

Erect, 0.4 to 1 m in height. Leaves glabrous or the lower surface somewhat pilose, oblong-lanceolate to lanceolate, slenderly acuminate, 10 to 50 cm long, 3 to 11 cm wide, the ligule prominent, 1 to 3 cm long. Spike ellipsoid, 5 to 12 cm long, thick, the bracts green, ovate to obovate, rounded or acute, about 4 cm long, each with 2 or 3 flowers. Flowers very fragrant. Calyx tubular, cleft on one side, about 4 cm long. Corolla-tube slender, 8 cm long, the lobes narrow, involute, about 4 cm long. Lip obcordate or obovate, white, pale-yellow in the center, 5 to 6 cm in diameter. Staminodes white, oblong-elliptic, obtuse, narrowed at the base, 4 to 5 cm long and 2 to 2.5 cm wide.

Very commonly cultivated, fl. June–Dec.; widely distributed in the Philippines, cultivated and naturalized. A native of India, now cultivated or spontaneous in most tropical countries.

3. KAEMPFERIA Linnaeus

Small stemless herbs from aromatic tuberous rootstocks, or sometimes with short stems. Leaves few, suborbicular to ovate or lanceolate, basal. Inflorescence spicate, few-flowered, shortly peduncled, erect, with few lanceolate bracts. Flowers white or violet, of short duration. Calyx membranaceous, tubular or clavate, sometimes split down one side. Corolla-tube slender, the lobes narrow, linear. Lip large, 2-lobed. Staminodes large, clawed, rounded, spreading. Stamen thin, flat, not exserted; anther narrow, crested. Ovary 3-celled. Capsule oblong, thin-walled. (In honor of E. Kaempfer, an early Dutch physician and botanist.)

Species about 55, tropical Asia and Malaya, 2 in the Philippines.

1. **K. GALANGA** L. Dusol, Gusol (Tag.).

A glabrous stemless herb from tuberous aromatic rootstocks. Leaves two, horizontally spreading, orbicular to broadly ovate, acute, obtuse, or broadly acuminate, 7 to 15 cm long, base rounded. Flowers few, 4 to 6 or more, pink, the bracts lanceolate, about 3.5 cm long. Corolla-tube slender, 2.5 to 3 cm long, the lip cleft to the middle, about 2.5 cm wide, white or pale-pink spotted with violet. Staminodes obovate, about 1.2 cm long. Staminal-crest quadrate, 2-lobed.

Not common in cultivation in Manila, fl. July–Aug.; widely distributed in the Philippines, cultivated and spontaneous, certainly introduced. A native of India, now widely spread in the eastern hemisphere, cultivated and spontaneous.

4. CURCUMA Linnaeus

Erect herbs from aromatic, fleshy rootstocks. Leaves distichous, oblong to oblong-elliptic or obovate, usually tufted. Spikes dense, peduncled, arising from the rootstocks, usually leafless, the bracts large, persistent, forming a dense, usually colored, cone-like or cylindric head, the upper bracts often longer than the lower ones. Flowers several in each bract, usually but a single one opening at a time, bracteolate. Calyx short, cylindric, toothed. Corolla-tube broad, funnel-shaped, sometimes split down one side, 2- or 3-toothed, the teeth ovate or oblong. Staminodes petaloid, united with the filament below. Lip orbicular or obovate, entire, emerginate, or 2-lobed. Stamen somewhat petaloid. Ovary 3-celled. Capsule membranaceous, globose, 3-valved. Seeds small, arillate. (From the Indian name, signifying yellow.)

Species about 42, India to Malaya, 2 introduced in the Philippines.

1. C. ZEDOARIA (Berg.) Rosc. Tamo, Barac (Tag.); Lampoyang (Vis.); Conic (Il.).

Rootstocks stout, fleshy, slightly aromatic, pale-yellow, with oblong, tuber-like branches. Leaves usually in pairs, erect, petioled, green, often with a purplish blotch in the center, elliptic-oblong to oblong-lanceolate, slenderly acuminate, 25 to 70 cm long, 8 to 15 cm wide. Scape from the rootstocks, not from the leaf-tuft, often appearing before the leaves, the peduncle 10 to 20 cm long, covered with few loose bracts. Spike cylindric, 5 to 8 cm in diameter, 10 to 15 cm long, composed of numerous, ovate to obovate, somewhat spreading, rounded bracts, the lower ones green, more or less tipped with pink, the upper ones usually longer and purple, each containing several flowers, the lower ones opening first. Calyx small, bifid. Corolla-tube about 2 cm long, yellowish-white, sometimes tinged with purple, the lip usually yellow, 2-lobed. (Fl. Filip. *pl. 3*, *Costus luteus.*)

In thickets and open places, common, fl. Jan.–Aug.; widely distributed in the Philippines in the settled regions, certainly introduced. Probably a native of India, now widely distributed in the warmer parts of the eastern hemisphere.

The Turmeric plant, *C. longa* L., with a very yellow root widely known here as *dilao*, is not uncommon in the Philippines, and its rhizomes are commonly sold in the Manila markets, but living specimens have not been found in our area. It resembles the above species, but its flower-scape is borne within the tuft of leaves, not directly from the rootstocks.

5. ZINGIBER Adanson

Stems erect, leafy, from fleshy, underground, more or less aromatic rootstocks. Leaves lanceolate to elliptic, distichous. Spikes erect, from the rhizomes, rarely terminating a leafy stem, cylindric, conic, or ovoid, usually peduncled, the peduncles covered with bracts, the bracts of the inflorescence green or colored, imbricate, usually holding water, each containing from 1 to several flowers. Calyx tubular, 3-lobed, short. Corolla-tube usually longer than the bract, slender, the lobes oblong to lanceolate, white or yellowish. Staminodes none. Lip 3-lobed, the middle lobe longer than the lateral ones. Connective of the anther prolonged into a curved beak. Ovary 3-celled. Capsule thin-walled, splitting into 3-valves. Seeds black, angled, arillate. (From the ancient Greek or Latin name, derived from the Indian name *sringavera.*)

Species 60, tropical Asia to New Guinea, about 5 species in the Philippines, some of them inperfectly known.

Spikes large, cylindric or ovoid, 5 to 20 cm long, the bracts orbicular, rounded or truncate.......... 1. *Z. zerumbet*

Spikes small, 5 cm long or less, the bracts ovate, cuspidate; cultivated only. 2. *Z. officinale*

1. **Z. ZERUMBET** (L.) Smith. Tumbong-aso (Tag.).

A glabrous, erect, herbaceous plant from tuberous rootstocks. Leafy stem 0.6 to 2 m high, the leaves numerous, distichous, lanceolate to oblong-lanceolate, 15 to 30 cm long, sessile or shortly petioled. Flower bearing scape produced from the rootstocks, 10 to 30 cm long, bracteate, bearing at its apex the ovoid to oblong or cylindric, green or red, cone-like inflorescence 5 to 20 cm long. Bracts numerous, orbicular, imbricate, greenish, turning red, holding water, 2 to 3 cm long. Flower 5 cm long, whitish or cream-colored, the tube as long as the bracts, the lip 3-lobed. (Fl. Filip. *pl. 370, Z, cassumunar.*)

In thickets, common, fl. July to Oct.; throughout the Philippines, certainly introduced. Tropics of the Old World, wild and cultivated.

* 2. **Z. OFFICINALE** Rosc. Luya (Tag.); Gengibre (Sp.); Ginger.

An erect glabrous plant from thickened, fleshy, very aromatic rootstocks. Stems 0.4 to 1 m high, leafy. Leaves distchous, lanceolate to linear-lanceolate, acuminate, 15 to 25 cm long, 2 cm wide or less, base narrowed. Scape erect, from the rootstocks, 15 to 25 cm high, covered with distant, imbricate bracts, the spike ovoid to ellipsoid, dense, about 5 cm long. Bracts ovate, cuspidate, about 2.5 cm long, pale-green. Calyx 1 cm long or somewhat less. Corolla greenish-yellow, its tube less than 2 cm long, the lip oblong-obovate, slightly marked with purplish. (Fl. Filip. *pl. 131.*)

Commonly cultivated, fl. Oct.-Dec.; widely distributed in the Philippines in cultivation. Probably a native of India, now cultivated in all tropical countries.

6. KOLOWRATIA Presl

Coarse tall plants from underground rootstocks. Stems stout, simple, leafy. Leaves oblong-ovate to lanceolate, large, spreading or reflexed, petioled, the ligule prominent, entire. Inflorescence terminal, branched, stiff, the branches short, rigid, scattered, clothed with large, oblong, persistent, rather stiff, densely arranged bracts, but one flower opening at a time. Calyx spathe-like, split down one side, 3-toothed at the apex. Corolla-tube short, slightly curved, the lobes broad, the upper one erect, concave, wider than the other two, spreading or reflexed ones. Staminodes short, oblong or ovate, attached to the sides of the lip above the base. Lip obovate, slightly 3-lobed or subtruncate. Filament broad, fleshy, adnate to the corolla-tube; anther elongated, grooved on the inner face, the connective prolonged as a flat, ovate appendage. Ovary 3-celled; ovules many; style very slender, stigma obconic. Capsule ellipsoid, somewhat woody, ultimately splitting into 3 valves; seeds very numerous. (In honor of Count F. Kolowrat-Liebsteinsky of Hungary.)

Species 2, both confined to the Philippines.

1. **K. elegans** Presl (*Alpinia elegans* K. Sch.). Tagbac, Talbac (Tag.).

A stout herbaceous plant 2 to 4 m high, nearly glabrous, the rootstocks stout, stems swollen at the base, leafy throughout. Leaves coriaceous, spreading or reflexed, oblong-ovate to lanceolate, acuminate, or caudate-acuminate, 25 to 60 cm long, 5 to 20 cm wide, the petioles stout, short. Inflorescence about 30 cm long, the base of the peduncle with an oblong-lanceolate, chartaceous, 8 to 12 cm long bract. Branches about 8, scattered, spreading, stout, about 5 cm long, covered with persistent bracts, each branch bearing several to many flowers, but only one opening at a time. Calyx about 4 cm long. Corolla pale-straw-colored, about 7 cm long, the tube cylindric, the upper lobe about 4 cm long, concave, erect, the other two as long but reflexed, oblong-ovate; lip about as long as the corolla-lobes, spreading. Capsule ellipsoid, woody, 3 to 4 cm long, splitting into 3 valves, crowned by the persistent calyx. (Fl. Filip. *pl. 1*, *Renealmia elegans*.)

Waste places, Singalon, rare, fl. all the year; widely distributed in the Philippines. Endemic.

7. COSTUS Linnaeus

Tall leafy herbs, sometimes branched, the leaves oblong to lanceolate, spirally arranged, the sheaths entirely closed. Inflorescence a dense, cone-like, terminal or basal spike, the bracts stiff, imbricate, persistent. Calyx tubular, 3-lobed. Corolla-tube broadly funnel-shaped, as long as the calyx-tube, the lobes large, showy, oblong to lanceolate. Lip large, obovate, somewhat spathe-like below. Stamen very broad and thin, petaloid, the staminodes none. Capsules woody, 3-celled, splitting down the back of each cell; seeds very numerous, black, angled. (The ancient Greek name.)

Species about 100, chiefly in South America and Africa, few in the Indo-Malayan region, 2 in the Philippines.

1. **C. speciosus** (Koenig) Smith.

Stems stout, about 1 m high and 1.5 cm in diameter, leafy. Leaves spirally arranged, oblong, acuminate, subsessile, about 30 cm long, softly pubescent on the lower surface. Spikes solitary, terminal, ovoid, very dense, 5 to 8 cm long, the bracts ovate, acuminate, purple, 3 to 4.5 cm long. Calyx flattened, purple, about 3 cm long, the lobes 3, rather short, ovate. Corolla-segments white, oblong, 5 to 6 cm long, pointed. Lip white, suborbicular, 6 to 8 cm long, crinkled, irregularly and rather finely toothed, the margins incurved and meeting. Stamen flat, including the broad connective about 5 cm long, 12 to 15 mm wide. Capsules ovoid to globose, red, crowned by the persistent calyx, 1.5 to 2 cm long. (Fl. Filip. *pl. 442.*)

Occasionally cultivated, fl. Sept.–Dec.; widely distributed in the Philippines. India to Formosa, southward to New Guinea.

30. CANNACEAE (CANNA OR TICAS-TICAS FAMILY)

Erect, coarse, perennial, unbranched herbs with leafy stems from fleshy rootstocks. Leaves large, oblong, acute or acuminate, parallel-veined from the midrib, their petioles sheathing the stem. Flowers irregular, perfect, medium to large, usually bright-colored and showy, in lax, simple or branched, terminal racemes, bracteate. Sepals 3, small, oblong. Corolla-tube cylindric, the segments 3, lanceolate, equal. Staminal-tube connate below with the corolla-tube, the segments 4 or 5, unequal, petioled, much larger than the petals, one of the smaller ones with a single, 1-celled anther attached to its margin. Ovary inferior, 3-celled; ovules many;

style flattened, adnate to the base of the staminal-tube, free above. Fruit globose to ovoid, capsular, the seeds globose, hard, black.

A single genus in tropical America, some species now distributed in all warm countries.

1. CANNA Linnaeus

Characters of the Family. (From the Latin "cane," probably of Oriental origin.)

Species 30 or more, natives of tropical and subtemperate America, some now found in all warm countries.

1. Flowers red, less than 12 cm in length.
  2. Flowers 5 to 6 cm long.
    3. Stems green, usually less than 1.5 m high........................ 1. *C. indica*
    3. Stems, midribs of the leaves, inflorescence, and fruits purplish; plant 2 to 3 m high.. 2. *C. speciosa*
  2. Flowers 10 to 11 cm long.
    3. Whole plant green, inflorescence very glaucous............ 3. *C. coccinea*
    3. Whole plant purplish or bronzy-purple................ 4. *C. warscewiczii*
1. Flowers yellow, sometimes with small orange dashes............ 5. *C. glauca*
1. Flowers very large, up to 16 cm in length, lemon-yellow blotched and mottled with orange-yellow and reddish-yellow.
6. *C. flaccida* × *iridiflora*

1. C. INDICA L. Ticas-ticas (Tag.); Indian Shot.

Whole plant green, glabrous, up to 1.5 m in height. Leaves 10 to 30 cm long. Inflorescence somewhat waxy-glaucous. Flowers red, solitary or in pairs, the bracts about 1.3 cm long. Sepals 1 cm long, greenish-white, sometimes tinged with red. Corolla-tube about 1 cm long, the lobes red or reddish, about 3 cm long, involute. Staminodes bright-red, the outer one about 4 cm long, somewhat spatulate, acute or slightly acuminate, the others somewhat smaller, the antheriferous one as long as the outer one, about 5 cm wide, recurved above the insertion of the anther. Capsules green, oblong-ovoid, softly echinate, 2 to 2.5 cm long. (Fl. Filip. *pl. 4.*)

Common in waste places, fl. all the year; throughout the Philippines, thoroughly naturalized. All tropical countries probably originating in tropical America.

2. C. SPECIOSA Rosc.

Stems 2 to 3 m high, purplish, as are the midribs, petioles, and margins of the leaves, and the inflorescence, the latter with a glaucous bloom. Leaves up to 35 cm in length. Flowers red, usually solitary, about 5 cm long, the bracts about 12 mm long. Sepals purplish, erect, about 13 mm long. Petals erect, about 4 cm long, involute. Staminodes red, the outer one spatulate, 4 cm long, toothed at the apex, the others similar but narrower, the antheriferous one about 5 mm wide, reflexed above the insertion of the anther. Capsules reddish-brown or purplish, up to 3 cm in length.

Not uncommon in waste places, fl. all the year. A native of tropical America.

*3. C. COCCINEA Mill.

Stems about 1.5 m high, green, the inflorescence slightly tinged with purple and with a conspicuous waxy bloom. Leaves 30 to 40 cm in length.

Flowers deep-red, about 10 cm long, the bracts ovate to oblong-ovate, blunt, 2 cm long or less, purplish, glaucous. Sepals purplish and somewhat glaucous, 1.5 cm long, acute. Petals 6 cm long, 1 cm wide when spread, involute, slightly paler red than the staminodes and yellowish inside. Staminodes deep-red, about 8 cm long and 3 cm wide, irregularly retuse, rarely rounded, tapering to the base, the fourth one narrower, the staminiferous one about 6 cm long and 7 to 8 mm wide, falcate, recurved. Capsules not maturing.

Cultivated for ornamental purposes, fl. all the year, its range in the Philippines unknown. A native of tropical America.

*4. C. WARSCEWICZII Dietr.

Whole plant bronzy-purple, 1 to 1.5 m high. Flowers solitary, red, the tube with traces of yellow on the inside, about 11 cm long. Bract about 6 mm long, suborbicular, purplish. Sepals purplish, 1.5 cm long, obtuse. Corolla-tube about 2 cm long, the petals reflexed, slightly involute, 5 cm long, acuminate, purplish-red. Staminodes 4, about 8 cm long and 3.5 cm wide, red, rounded, the fourth somewhat broader and somewhat yellowish in the basal part, about 2 cm wide, somewhat inequilaterally falcate, recurved above the anther. Capsules not maturing.

Commonly cultivated especially for its colored foliage, fl. all the year. A native of tropical America.

*5. C. GLAUCA L.

Erect, green, 1 to 1.5 m high. Leaves 20 to 35 cm long. Flowers yellow, solitary, about 7 cm long, sometimes with faint orange-red dashes inside, the inflorescence glaucous. Bracts suborbicular, about 1.5 cm long. Sepals greenish, about 2 cm long. Petals erect, slightly involute, yellow, 4 to 5 cm long. Staminodes 4, the first three about 6.5 cm long, and 2.2 cm wide, cleft or irregularly retuse at the apex or the third entire, the fourth recurved and narrower. Stamen about 6 mm wide, recurved above the insertion of the anther.

Cultivated for ornamental purposes, fl. all the year. A native of tropical America. A form with much larger flowers, about 12 cm long, with more prominent dashes of orange-red, also cultivated, may be referable here.

*6. C. FLACCIDA Salisb. × IRIDIFLORA Ruiz. & Pav. Bandera Española (Sp.-Fil.); Spanish Flag; Canna.

A commonly cultivated hybrid, 1.5 to 2 m high, green, the inflorescence somewhat glaucous. Leaves up to 60 cm in length. Flowers large and showy, up to 16 cm in length, lemon-yellow, variously blotched and spotted with orange-red and orange-yellow, usually in pairs. Bracts green, about 1.5 cm long, obtuse. Sepals green, purplish above 2.5 cm long, obtuse. Corolla-tube about 2.5 cm long, the petals 6 to 6.5 cm long, reflexed, yellow and purplish, acuminate. Staminal-tube up to 3.5 cm long, the staminodes, obovate-oblong, 10 to 11 cm long, margins crinkled and undulate. Stamen about 8 cm long and 4 cm wide. Capsules not maturing.

Very commonly cultivated, fl. all the year. One of the numerous hybrids produced in Europe, from American species, various forms now found in all large towns in the Philippines in cultivation.

31. MARANTACEAE (ARROW ROOT OR AROUROU FAMILY)

Perennial herbaceous plants from more or less fleshy rootstocks, stemless or with erect, simple or branched stems. Leaves usually large, pinnately veined from the midrib, usually distichous, petioled, the petioles sheathing the stem below. Flowers very irregular, perfect, often in pairs, in dense bracteate spikes or in open, more or less panicled inflorescences. Sepals 3, equal, free. Corolla-tube short or elongated, usually slender, 3-lobed, the exterior lobe often large and more or less concave or hooded. Staminodes usually 4, the two interior ones always present, one cucullate, the other callose, the exterior ones petaloid. Stamen 1, petaloid, bearing a 1-celled anther. Ovary inferior, 1- to 3-celled; ovules 1 in each cell; style slender, curved. Fruit capsular, nut-like or berry-like, dehiscent or indehiscent. Seeds hard, arillate.

Genera 26, species about 300, in the tropics of both hemispheres, 5 genera and 8 or 9 species in the Philippines.

MARANTA Linnaeus

Erect branched herbs from tuberous rootstocks. Leaves petioled, ellipsoid to ovate, acuminate. Flowers few, in pairs, racemose, sometimes laxly and somewhat dichotomously paniculate, the bracts few, usually caducous. Sepals 3, narrow. Corolla-tube cylindric, slender, elongated, often swollen at the base, the lobes 3, subequal. Staminal-tube commonly short, the two exterior staminodes broad, petaloid usually obovate, the others shorter. Stamen petaloid, the anther 1-celled, attached to its margin. Fruit obovoid or oblong, nut-like, indehiscent. (In honor of B. Maranta, a Venetian botanist and physician.)

Species 14, in tropical America, 1 now more or less cultivated in all tropical countries.

1. M. ARUNDINACEA L. Arourou (Sp.-Fil.); Arrow Root.

An erect, glabrous, dichotomously branched, perennial herb 0.4 to 1 m high, from fleshy, fusiform rootstocks. Leaves ovate-oblong, thin, petioled, acuminate, base rounded, 10 to 20 cm long, green. Inflorescence terminal, lax, divaricate, few-flowered. Flowers white, 2 cm long.

Occasional in our area, fl. most of the year; cultivated to a small extent and occasionally spontaneous in the Philippines. Introduced from tropical America at an early date, now found in most tropical countries.

Var. VARIEGATUM (N. E. Br.) (*Phrynium variegatum* N. R. Br.).

Leaves variously marked with white, frequently entire leaves being white with little or no green.

Commonly cultivated in gardens and as a house plant for its ornamental foliage; introduced from Singapore.

In addition to the above, various species or horticultural forms of the American genus *Calathea* are found in cultivation in Manila. The forms here usually have leaves purplish beneath, and variously variegated on the upper surface, in one form with narrow, parallel, red lines between each two primary nerves All or most of the forms here appear to be referable to *Calathea ornata* Koernicke (*C. sanderiana* Hort.).

32. ORCHIDACEAE[1] (ORCHID OR DAPO FAMILY)

Terrestrial or epiphytic, usually succulent or fleshy herbs, the former usually with thickened tuberous roots, the latter often with thickened bases (pseudobulbs), green, more rarely white and colorless or brownish saprophytes, exceedingly variable in habit. Flowers very irregular, perfect, rarely 1-sexual and monoecious. Perianth of 6 free or variously combined parts, in two sets, the three outer (sepals) more or less alike, the three inner (petals) dissimilar, 2 lateral ones alike, the third (lip or labellum) very different in shape. Stamens and style united into a column opposite the lip, the anther 1, rarely 2, on the front, or back of the column. Pollen-grains usually cohering in 1 to 4 pairs of waxy or powdery, globose to oblong masses (pollinia), in each cell. Ovary inferior, 1-celled; ovules exceedingly numerous, on 3 parietal placentae. Fruit a 1-celled, 3-valved capsule, containing innumerable, minute, almost dust-like seeds.

Genera over 450, species about 7,000, in all parts of the world, chiefly tropical, about 77 genera and over 500 species in the Philippines.

In the consideration of the *Orchidaceae* only those species growing naturally within the area covered by this work have been included, no attempt having been made to discuss the numerous forms brought in from the provinces and cultivated; to include the latter would necessitate a consideration of practically all the species with showy flowers found at low altitudes in the Philippines, as well as many of the forms with small and insignificant flowers. The presence of these cultivated plants in Manila is dependent on a continued supply, which varies in quantity and in number of species from year to year, so that a complete "orchid flora" for Manila for one year might not closely apply to those species found here in other years.

As a rule only species that grow naturally in the Archipelago at low altitudes can be successfully grown in Manila, those found above altitudes of about 800 meters, usually soon dying when brought to sea level. The common native name for all epiphytic orchids, the bulk of our species, is *dapo*, but this name is applied to other epiphytic plants, such as species of ferns growing as epiphytes, and even to parasitic plants, such as *Loranthus*, etc.

Among the more generally cultivated species are representatives of the genus **Dendrobium**, such as *D. superbum* Reichb. f., with large, somewhat rank-scented, purple flowers from its leafless stems, flowering in February and March, the flowers 5 to 6 cm long; *D. heterocarpum* Wall. (*D. aureum* Lindl.) with yellowish flowers about 3.5 cm long, and *D. taurinum* Lindl. (Fl. Filip. *pl. 429*), with much-elongated stems, broad, elliptic leaves, and large pink and purplish flowers. **Phalaenopsis**, species with green leaves and large white flowers, *P. amabalis* Blume, and its variety *aphrodite* Ames, locally known as "dapo mariposa," that is, butterfly-orchid: with mottled leaves and large pink flowers, *P. schilleriana* Reichb. f.; and with mottled leaves and white, purple-spotted flowers, *P. stuartiana* Reichb. f.,

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[1] For special papers on Philippine Orchidaceae, see Ames, O., "Orchidaceae." 1 (1905), 2 (1908), 3 (1908), and in *Philip. Journ. Sci.* 4 (1909) *Bot.* 593–600: 663–676; 6 (1911) *Bot.* 35–56; 7 (1912) *Bot.* 1–27: 125–143.

both locally known as "dapo tigre," that is, tiger orchid: with green leaves and medium, straw-colored or yellowish flowers with purplish markings, *P. luddemanniana* Reichb. f., and with green leaves and small pink flowers, *P. equestris* (Schauer) Reichb. f. **Vanda**, with elongated 2-ranked leaves and recemose flowers, *V. sanderiana* Reichb. f., from Mindanao with very large purplish flowers about 8 cm in diameter, and *V. lamellata* Lindl. (Fl. Filip. *pl. 465*), with white and purple flowers about 4.5 cm in diameter. **Aerides**, represented by *A. quinquevulnerum* Lindl. (Fl. Filip. *pl. 409*), with showy racemes of very fragrant flowers, each perianth-segment and the lip with a large purple spot. **Rhynchostylis**, with *R. retusa* (L.) Blume, simulating the preceding in habit and appearance, but with odorless flowers, and occasional species of **Paphiopedium** (*Cypridium*), as well as less desirable species of such genera as *Pholidota, Eria, Grammatophyllum* (Fl. Filip. *pl. 276*), *Cymbidium, Renanthera, Stauropsis, Trichoglottis* (Fl. Filip. *pl. 348.*), etc.

1. Terrestrial, saprophytic, white and colorless or brownish plants. 1. *Didymoplexis*
1. Terrestial herbs with green leaves.
    2. Leaves plicate; flowers few, in nodding racemes, the scapes from the rootstock.......... 2. *Geodorum*
    2. Leaves not plicate; flowers numerous in erect spikes or racemes terminating the leafy stem.......... 3. *Habenaria*

1. Elongated epiphytic plants with distichous leaves.
    2. Leaves not equitant.
        3. Stems not thickened at the base.......... 4. *Cleisostoma*
        3. Stems much thickened at the base.......... 5. *Dendrobium*
    2. Leaves equitant.......... 6. *Oberonia*

1. DIDYMOPLEXIS Griffith

A slender, leafless, white or brown saprophyte from thickened tuberous roots, the scape slender, erect, with few racemosely arranged flowers, the pedicels much elongated in fruit. Flowers small, the dorsal sepal connate with the petals forming a 3-fid upper lip, the lateral ones connate into an entire or 2-fid lower lip forming a small projection at the foot of the column. Lip inserted on the short column-foot, short, broad, included. Column elongated, narrow, narrowly 2-winged above, 2-toothed; stigma broad; anther broadly ovate. (Greek "twin" and "a knitting," in allusion to the connate sepals and petals.)

A monotypic genus, by some anthers reduced to *Gastrodia* R. Br.

1. D. pallens Griff.

A slender, white or brown, leafless saprophyte growing about clumps of bamboo, 6 to 20 cm high, the tuberous roots 1 to 3 cm long, up to 1 cm in diameter. Flowers white or flesh-colored, few, in lax racemes, the bracts much shorter than the pedicels. Ovary about as long as the pedicel which becomes greatly elongated in fruit. Lip fan-shaped, cuneate at the base. Sepals and petals adherent, forming a tubular perianth, 6 to 7 mm long. Column about 4 mm long, half-rounded below, narrowly winged above.

About clumps of bamboo, occasional, fl. June–July; of local occurrence in the Philippines. India to Formosa, southward to Malaya.

upper ones much reduced. Racemes 5 to 15 cm long, the bracts linear-lanceolate, the lower ones longer than the flowers. Flowers white, showy, the sepals oblong-lanceolate, 12 to 14 cm long. Petals oblong, 6 to 8 mm long. Lip variable, sometimes hastate, sometimes lanceolate, acute, 11 to 12 mm long. Spur usually wanting, when present slender and 2 mm long or less.

In thickets and open grass lands, San Lazaro, Masambong, etc., fl. Oct.–Nov.; widely distributed in the Philippines. Burma and the Malay Peninsula.

3. **H. congesta** Ames.

An erect, glabrous, rather slender terrestrial plant from somewhat fleshy rootstocks, 10 to 20 cm high. Leaves linear, grass-like, up to 11 cm long and 7 mm wide, ascending, acuminate, the lower ones somewhat clasping the stem, the upper ones passing gradually into linear-acuminate bracts. Racemes rather dense, ovoid, 2 to 5 cm long, many-flowered. Flowers white, odorless, the lateral sepals somewhat ovate, acute, 4 mm long, the dorsal one slightly shorter. Petals falcate, shorter than the dorsal sepal. Lip 3-parted, the lateral lobes linear, 4 mm long, the middle one broader, 6 mm long. Spur slender, about 7 mm long.

On banks of old rice-paddies, Caloocan, very rare, fl. Nov.–Dec.; of wide distribution in the Philippines but of very local occurrence. Endemic.

4. CLEISOSTOMA Blume

Epiphytic herbs with elongated leafy stems, emitting solitary roots at the nodes, the stems not thickened at the base. Leaves distichous, spreading, thick, flat, elongated, the base sheathing the stem. Flowers small, numerous, axillary, in spikes, racemes, or panicles. Sepals somewhat spreading, subequal, the petals similar to the sepals, both adnate to the column, spreading. Lip adnate to the base of the column, the base with a short or elongated spur with a scale or callus at its mouth. Column short, half-rounded, not winged. Anther terminal, 2-celled. Capsules narrow, elongated. (Greek "closed" and "mouth," in allusion to the structure of the spur.)

Species about 40, tropical Asia to Australia, about 5 in the Philippines.

1. **C. bicolor** Lindl.

An erect or ascending, vine-like epiphyte, quite glabrous, the stem often 2 m in length, 4 to 7 mm thick, with usually one, long, stout, lateral root at each internode. Leaves thick, narrowly oblong, 10 to 18 cm long, 2.5 to 3.5 cm wide, apex somewhat obliquely retuse, base narrowed, sheathing. Inflorescence lateral, 40 to 80 cm long, long-peduncled, simple or sparingly branched above, the flowers racemosely disposed. Flowers 1.5 to 1.8 cm in diameter, yellow-green with purple spots. Lateral sepals elliptic, about 7 mm long, the upper one oblanceolate, obtuse, about 1 cm long. Petals about 8 mm long. Apical lobe of the lip orbicular-cordate, acute, fleshy, about 2 mm long, the lateral lobes triangular.

In shaded ravines, opposite Guadalupe, fl. May–Aug.; widely distributed in the Philippines. Endemic.

5. DENDROBIUM Swartz

Slender or coarse, epiphytic plants, the stems often elongated, usually bulbous at the base. Leaves distichous, flat, sessile. Flowers solitary, fascicled, or racemose, sometimes small and insignificant, sometimes large and showy, white or variously colored. Sepals subequal, the lateral ones obliquely adnate to the foot of the column, and forming with it a sac. Lip contracted at the base, rarely clawed, adnate to the foot of the column, the side-lobes embracing the column, or spreading, or none, the terminal lobe flat to saccate. Column short, the foot long or short. Anther 2-celled; pollinia 4, in pairs in each cell. (Greek "tree" and "life," from the epiphytic habit of the species.)

Species nearly 600, tropical Asia through Malaya to Australia; and Polynesia, about 50 in the Philippines.

1. **D. crumenatum** Sw. White Dove Orchid.

Stems fascicled, glabrous, elongated, up to 1 m in length, slender, the basal bulbs 8 to 12 cm long, about 2 cm thick. Leaves scattered, distichous, oblong, obtuse, 5 to 8 cm long and 1.5 to 2.5 cm wide. Flowers fugacious, appearing on the upper parts of the stems at the nodes, white, the center pale-yellow, very fragrant, solitary or somewhat fascicled, 2.5 to 3 cm long, lasting a day or less.

Occasional on trees, Santa Mesa to San Juan del Monte, also commonly cultivated, fl. at intervals, all the plants in the same region flowering the same day; widely distributed in the Philippines. Indo-China to Malaya.

6. OBERONIA Lindley

Tufted, usually small, epiphytic plants with distichous, equitant, flattened leaves. Flowers very numerous, minute, in dense, often cylindric, solitary spikes or racemes terminating the leafy stems. Sepals broadly ovate or oblong, subequal, the petals smaller. Lip sessile, concave, entire or 2- to 4-lobed. Column very short; anther terminal, incumbent; pollinia 4, waxy, cohering. (After Oberon, king of the fairies.)

Species about 90, tropical Asia to the Mascarene Islands through Malaya to Australia and Polynesia, about 13 in the Philippines.

1. **O. merrillii** Ames.

A small, tufted, glabrous plant 9 cm high or less, with many fibrous roots, stemless, or with very short stems. Leaves fleshy, flattened, ensiform, acute, 2.7 to 7 cm long, about 5 mm wide, shorter than the inflorescence. Peduncle slender, 7 to 12 cm long, the spike 4 to 9 cm long, about 4 mm in diameter, with numerous small bracts below the flower-bearing part. Flowers minute, reddish, verticillate or subverticillate, the verticels 2 to 3 mm apart, short-pedicelled. Sepals 1 mm long or less. Petals suborbicular, about 0.75 mm in diameter, the lip 3-lobed, as long as the petals, the lateral lobes minute, smaller than the middle one.

On santol trees, Masambong and along the Novaliches Road, fl. Nov.; of very local occurrence in Luzon. Endemic.

Subclass 2. DICOTYLEDONEAE: Plants producing seeds with two cotyledons.

33. CASUARINACEAE (CASUARINA OR AGOHO FAMILY)

Leafless trees, the branchlets cylindric, grooved, jointed, the internodes terminating in short sheaths of connate subulate scales (reduced leaves). Flowers unisexual. Staminate flowers in terminal spikes formed of short, superposed, toothed cups; sepals 1 or 2, concave, circumsciss at the base; stamen 1, inflexed in bud. Pistillate flowers in ovoid or globose heads, bracteate and 2-bracteolate; ovary minute, 1-celled; style 2-fid; the arms stigmatose to the base; ovules 2, collateral. Fruit an ovoid or oblong cone formed of the enlarged hardened bracts and bracteoles together forming 2-valved cavities enclosing the compressed, winged achenes, the wing terminal.

A single genus, species mostly Australian, a few Malayan and Polynesian.

1. CASUARINA Forster

Characters of the Family. (From the Latin name of the cassowary, cn account of the resemblance of the branches to the feathers of that bird.)

Species about 25, 3 in the Philippines, one cultivated in our area.

1. **C. equisetifolia** Forst. Agoho (Tag.).

A dioecious tree, 15 m high or less, the crown narrowly pyramidal, resembling some of the conifers in appearance. Branchlets very slender 20 cm long or less, deciduous, composed of many joints, the internodes 1 cm long or less. Somewhat 6- to 8-angled, sulcate. Staminate spikes slender, 1 to 3 cm long. Cones usually ellipsoid, 1 to 2 cm long, composed of about 12 rows of achenes enclosed in the hardened bracts.

Cultivated for ornamental purposes, fl. most of the year; widely distributed in the Philippines along the seashore and some rivers, the wood very hard. India to Australia and Polynesia; cultivated in other tropical countries.

34. PIPERACEAE[1] (PEPPER OR ICMO FAMILY)

Succulent herbs or climbing woody or subherbaceous vines, usually aromatic. Leaves simple, entire, alternate, rarely opposite or whorled, frequently inequilateral; stipules none or 2 and connate, or adnate to the petiole. Flowers minute, 1- or 2-sexual, rarely perfect, in axillary or terminal, usually slender, catkin-like spikes. Perianth none. Stamens 2 to 6. Ovary 1-celled; stigma sessile, simple or penicillate; ovules solitary. Fruit a small, ovoid or globose drupe, often in dense, fleshy, cylindric spikes.

Genera 9, species 1,200 or more in the tropics of both hemispheres, 2 genera and about 125 species in the Philippines.

Low succulent herbs with minute fruits, the stigmas usually penicillate. 1. *Peperomia*

Climbing suffrutescent or somewhat woody vines, the fruits not minute, the stigmas not penicillate........ 2. *Piper*

1. PEPEROMIA Ruiz & Pavon

Annual or perennial, small, simple or branched, succulent herbs. Leaves alternate, opposite, or whorled, entire, without stipules. Spikes terminal or leaf-opposed, solitary or fascicled, rarely axillary. Flowers minute, perfect, sessile or sunk in the rachis of the slender spikes, bracteate. Stamens 2. Ovary 1-celled, 1-ovuled; stigma usually penicillate. Fruit minute, indehiscent. (Greek "pepper-like.")

Species 400 or more, in all tropical countries, chiefly American, 22 in the Philippines.

Leaves 1 to 3 cm long, pale-green, base cordate, not peltate....1. *P. pellucida*

Leaves up to 15 cm long, green, longitudinally striped with gray, base rounded, peltate; cultivated only........ 2. *P. argyreia*

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[1] For a consideration of the Philippine species see De Candolle, C., "A Revision of Philippine Piperaceae." *Philip. Journ. Sci.* **5** (1910) *Bot.* 405–463.

1. P. **PELLUCIDA** HBK.

An annual, very succulent, erect, branched herb, 5 to 40 cm high, the stems round, often 5 mm thick, pale-green. Leaves ovate, acute or obtuse, base broad, cordate, pale-green, pellucid, shining, 1 to 3 cm long. Spikes green, erect, slender, 1 to 6 cm long, the fruits globose, brownish, less than 1 mm thick.

Very common in damp shaded places, on damp walls etc., fl. all the year. A native of tropical America, now widely distributed in most tropical countries.

*2. P. **ARGYREIA** Morren.

A glabrous plant with large peltate leaves longitudinally striped or blotched with gray between the nerves, the stems and petioles purplish. Petioles up to 15 cm long. Leaves broadly ovate, 8 to 15 cm long, apex shortly and broadly acuminate, base rounded, the nerves 8 to 10, the flowering stalk sometimes bearing much smaller reduced leaves which are often not peltate. Spikes very slender, up to 10 cm in length.

Cultivated, Singalon, fl. at intervals all the year. Of recent introduction here, a native of tropical America.

2. PIPER Linnaeus

More or less climbing shrubs with swollen nodes, aromatic when crushed. Leaves entire, usually unequally sided, pointed, usually longitudinally nerved. Flowers small, dioecious, rarely perfect, in short or elongated spikes, each flower subtended by a small bract, frequently also with lateral bracteoles, the former peltate or cupular and adnate to the rachis. Perianth none. Stamens 1 to 4; filaments short; anthers 2-celled. Ovary 1-celled, 1-ovuled; stigmas 2 to 5. Fruit ovoid or globose, usually yellow or red. (The ancient Latin name.)

Species about 650, in all tropical countries, over 100 in the Philippines.

1. Fruit imbedded in the pulp of the mature spike.
    2. Leaf multiplinerved, that is some of the nerves basal, others leaving the midrib above the base .... 1. *P. betle*
    2. Leaf penninerved, all the nerves leaving the midrib, none basal. 2. *P. retrofractum*
1. Fruit free, not imbedded in pulp; leaves 7-nerved from the base. 3. *P. loheri*

1. P. **BETLE** L. Icmo (Tag.); Betel Pepper.

A glabrous climbing vine reaching a height of 2 to 4 m. Upper leaves ovate, 10 to 13 cm long, mostly 7-nerved from near the base, the outer pair of nerves free to the base, apex acuminate, base somewhat inequilaterally rounded or cordate, the petioles 1.5 to 2.5 cm long, sheathing. Male spikes about as long as the leaves, about 2 mm in diameter, the rachis hirsute. Female spikes, when mature, red, fleshy, 2 to 4 cm long, 0.5 to 1 cm thick. (Fl. Filip. *pl. 12.*)

Cultivated extensively in Pasay, fl. occasionally; throughout the Philippines, wild and cultivated, probably introduced. Cultivated in all tropical countries.

2. **P. retrofractum** Vahl. Sabía (Tag.).

Climbing, reaching a height of 2 to 4 m, glabrous. Leaves short-petioled, pale when dry, oblong- to ovate-elliptic, 8.5 to 16 cm long, base acute, obtuse or slightly cordate, subequilateral or somewhat inequilateral, apex acuminate, penninerved, the lateral nerves 3 to 5 on each side, ascending. Male spikes shorter than the leaves, slender. Female spikes, when mature. red, fleshy, cylindric, 2 to 5 cm long, about 1 cm in diameter.

In thickets Masambong etc., fl. Jan.–Apr.; widely distributed in the Philippines. Tropics of the Old World, introduced in the West Indies.

3. **P. loheri** C. DC. Litlit (Tag.).

A dioecious glabrous vine reaching a length of several meters. Leaves thin when dry, ovate to ovate-lanceolate, 9 to 10 cm long, 7-nerved from the acute to broadly rounded, very slightly inequilateral base, apex sharply acuminate, petioles up to 2 cm in length. Male spikes filiform, as long as the leaves. Female spikes about as long as the leaves, slender, the fruits scattered, not imbedded in the pulpy spike, yellow, about 4 mm long.

In thickets, Singalon, Paco, Pasig, etc., fl. Aug.–Dec.; widely distributed in Luzon. Endemic.

35. ULMACEAE (ELM OF HANAGDONG FAMILY)

Shrubs or trees with alternate, simple or toothed, usually distichous, frequently inequilateral leaves, and watery sap, the stipules small, falling early. Flowers small, perfect, polygamous, or dioecious, in axillary cymes, racemes, or sometimes solitary or fascicled. Calyx of 4 or 5, rarely fewer or more, usually imbricate, sometimes induplicate-valvate sepals which are more or less united at the base or free. Corolla none. Stamens as many as the calyx-segment opposite the lobes. Ovary superior, free, 1-, rarely 2-celled; stigmas 2; ovule 1, pendulous, anatropous, or amphitropous. Fruit (in our genera) drupaceous or nut-like, mostly small.

Genera 14, species about 140, in the warmer parts of both hemispheres, 5 genera and about 11 species in the Philippines.

1. TREMA Loureiro

Trees or shrubs with ovate to lanceolate, acuminate, usually pubescent and scabrid, distichous, finely toothed leaves which are 3- to 5-nerved at the base. Flowers unisexual or polygamous, small, in rather dense, short, axillary cymes. Male flowers with 4 or 5 induplicate-valvate sepals. Stamens erect. Rudimentary ovary none or very small. Female flowers with induplicate-valvate sepals, those of the perfect flowers somewhat valvate. Ovary sessile; style terminal; stigmas 2; ovule pendulous. Fruit a small ovoid to globose drupe. (Greek "hole," from the small pits in the endocarp of some species.)

Species about 30 in the tropics of both hemispheres, 2 or 3 in the Philippines.

1. **T. amboinensis** Blume. Hanagdong (Tag., Vis.); Hagod (Tag.).

A small tree 5 to 8 m high with elongated branches, the leaves distichous, the upper surface scabrid, the lower one usually pale and rather softly and densely pubescent. Leaves oblong-ovate to lanceolate, 8 to 15 cm long, base broad, cordate, usually somewhat inequilateral, prominently 3-nerved, apex long and slenderly acuminate, margins finely toothed. Cymes dense, pubescent, 1 to 2.5 cm long. Flowers very numerous, about 3 mm long, white. Drupes ovoid, about 3.5 mm long.

Not common in our area, in thickets and open places, fl. Jan.–Apr.; throughout the Philippines at low altitudes. India to southern China and Malaya.

36. MORACEAE (MULBERRY, FIG, OR BALETE FAMILY)

Shrubs or trees, sometimes vines, usually with milky sap, rarely herbaceous, with alternate or opposite, entire, toothed, or lobed leaves, the stipules present, often early deciduous. Flowers small, unisexual, often monoecious, densely crowed on the outside of small or large, fleshy, globose to elongated, thick or slender receptacles, or covering the inside of a closed receptacle. Male flowers with from 2 to 6, usually 4, perianth-segments, which are imbricate or valvate, free or more or less united below. Stamens as many as the segments, sometimes only 1. Female flowers with usually 4, rarely fewer or more segments, often more or less enlarged and enveloping the achene at maturity. Ovary 1-, rarely 2-celled, superior, half-superior, or inferior; styles or stigmas 2 or 1, simple or branched; ovules solitary, pendulous. Fruit various, composed of numerous more or less united carpels, each surrounded by its accrescent fleshy perianth, rarely dry, sometimes (*Ficus*) the individual fruits borne on the inside of a fleshy, closed receptacle.

Genera 67, species about 1,000, chiefly in the tropical regions of both hemisphers, few in subtemperate regions, 13 genera and about 150 species in the Philippines.

1. Flowers and mature fruits borne on the inside of a closed receptacle. 1. *Ficus*
1. Flowers on the outside of the receptacle.
  2. Erect shrubs or trees.
    3. Trees with large fleshy fruits, each composed of numerous ripened carpels with their fleshy pericarps, forming a variously tubercled, echinate, or roughened syncarp.......... 2. *Artocarpus*
    3. Fruits small.
      4. Female flowers solitary or few together, pedicelled; fruit usually a solitary carpel.......... 3. *Streblus*
      4. Female flowers numerous, crowded; fruit composed of many carpels.
        5. Trees with distichous, pinnately nerved leaves, the flowers in bracteate, usually lobed receptacles.......... 4. *Castilloa*
        5. Shrubs with palmately 3- or 5-nerved leaves, the flowers in dense short spikes.......... 5. *Morus*
  2. Climbing shrubs or vines.
    3. Unarmed.......... 6. *Malaisia*
    3. Armed with stout, often elongated spines.......... 7. *Cudrania*
  2. A small suffrutescent herb, the male and female flowers intermixed, in small, axillary, peduncled heads.......... 8. *Fatoua*

1. FICUS Linnaeus

Trees or shrubs, often climbing, with milky juice. Leaves alternate or opposite, entire, toothed, or lobed, smooth or rough. Flowers minute, very numerous, on the inner wall of a closed usually ovoid or globose, fleshy receptacle, the receptacles axillary or variously arranged on the trunk and larger branches. Male flowers with a 2- to 6-fid perianth. Stamens 1 or 2, rarely more. Female flowers with a perianth as in the male, or imperfect or none. Ovary usually oblique. Achenes small, crustaceous. (The ancient Latin name.)

Species 800 or more in all tropical countries, few in warm temperate regions, about 100 in the Philippines.

A very large and polymorphous genus, many species being erect shrubs or trees, a few unbranched, others being vines, and very many having a "strangling" habit, starting on some other tree, with a vine-like habit, eventually killing the supporting host and assuming a tree-like habit.

The receptacles are sometimes unisexual, but more often bear both male and female flowers, the former usually among or near the scales at the orifice. In addition to the male and female flowers, gall-flowers similar to the latter, but with the ovary occupied by the pupa of an *Hymenopterous* insect, are usually present.

1. Erect unbranched shrubs with large leaves up to 80 cm long crowded at the ends of the trunk........ 1. *F. pseudopalma*
1. Branched shrubs or trees with leaves less than 40 cm long.
  2. Receptacles borne on the trunk and larger branches on special, branched, leafless inflorencences........ 2. *F. nota*
  2. Receptacles in the leaf-axils, or in the axils or fallen leaves, solitary, in pairs, or fascicled.
    3. Leaves harsh and rough to the touch, often variously toothed or lobed, sometimes entire or nearly so.
      4. Leaves very strongly obliquely cordate, fragrant in drying; receptacles densely hirsute........ 3. *F. odorata*
      4. Leaves not obliquely cordate; receptacles glabrous or somewhat hispid.
        5. Leaves alternate........ 4. *F. ulmifolia*
        5. Leaves opposite........ 5. *F. cumingii*
    3. Leaves smooth, not at all roughened, always entire.
      5. An erect shrub or small tree with more or less angled or ridged receptacles........ 6. *F. hauili*
      5. Trees or shrubs starting as epiplytes and eventually strangling their host, assuming a tree-like form; receptacles globose or ovoid, not ridged or angled.
        6. Receptacles numerous, borne on the branchlets below the leaves in the axils of fallen leaves; leaves 12 to 20 cm long, long-petioled........ 7. *F. stipulosa*
        6. Receptacles solitary or in pairs in the leaf-axils.
          7. Leaves very densely nerved, the nerves parallel, close, the secondary ones as prominent as the primary ones.
            8. Leaves 15 to 25 cm long; stipules very large, thin, red, deciduous; cultivated only........ 8. *F. elastica*
            8. Leaves less than 15 cm long; stipules small, inconspicuous........ 9. *F. benjamina*
          7. Primary nerves distant, much more prominent than the secondary ones.
            8. Petioles 6 to 12 mm long; leaves very coriaceous; receptacles sessile........ 10. *F. indica*
            8. Petioles up to 3.5 cm long; leaves chartaceous; receptacles shortly peduncled........ 11. *F. concinna*

1. **Ficus pseudopalma** Blanco. Niog-niog, Niog-niogan (Tag.); Lamiog, Sulamiog (Viz.).

An erect, glabrous, unbranched shrub 2 to 6 high, the trunk 4 to 6 cm in diameter, with prominent leaf-scars. Leaves crowded at the end of the trunk, giving the plant the appearance of a small palm, oblanceolate, acute or acuminate, coriaceous, up to 80 cm in length, narrowed to the slightly cordate base, subsessile or shortly petioled, the margins coarsely and irregularly sinuate-toothed; stipules lanceolate, persistent, 5 to 7 cm long. Receptacles dark-green, ovoid, obscurely angular, 3 to 4 cm long, usually in pairs on short peduncles in the axils of the leaves. (Fl. Filip. *pl. 356.*)

In thickets near San Pedro Macati, also cultivated in the old Botanic Garden, fl. all the year; widely distributed in the Philippines at low altitudes. Endemic.

2. **F. nota** (Blanco) Merr. Tibig (Tag.).

An erect tree 4 to 8 m high, more or less pubescent. Leaves oblong to oblong-obovate, 15 to 35 cm long, acuminate, base somewhat inequilateral, cordate, margins distantly and irregularly toothed, the teeth small, more or less pubescent, not or slightly roughened. Receptacles borne in large masses on special, branched inflorescences springing directly from the trunk and from the larger branches, 10 to 25 cm in length, frequently very dense, the receptacles themselves subglobose, green or when mature yellowish, fleshy, 2 to 3.5 cm in diameter.

Occasional in thickets and not uncommon in yards etc., fl. all the year; throughout the Philippines at low and medium altitudes. Endemic.

3. **F. odorata** (Blanco) Merr. Paquiling (Tag.).

A tree 6 to 9 m high, very fragrant in drying, the leaves harsh, the upper surface with numerous hard papillae, the lower surface also rough and more or less pubescent, very strongly inequilateral and obliquely cordate, one basal lobe broad and rounded, the other usually acute, 15 to 25 cm long, acuminate, margins obscurely toothed. Receptacles axillary, solitary, sessile, subglobose, densely hirsute, yellowish when mature, 1.5 to 2.5 cm in diameter. (Fl. Filip. *pl. 358.*)

Occasionally cultivated in our area, fl. all the year, the rough leaves being used for scouring purposes; widely distributed in the Philippines. Endemic.

4. **F. ulmifolia** Lam. (*F. sinuosa* Miq.). Isis, Asis (Tag.); Hagupit (Vis.); Uplas (Il.).

A shrub usually from 3 to 5 m high. Leaves alternate, variable, very harsh, oblong, sub-entire or undulately lobed or coarsely toothed, sometimes deeply and narrowly lobed, acuminate, base rounded, 3-nerved, often inequilateral, 9 to 17 cm long, 4 to 8 cm wide. Fruits axillary, solitary or in pairs, soft and fleshy when mature, orange-red to purplish, ovoid to ellipsoid, about 1.5 cm long, the peduncles about 5 mm long.

Rather common in thickets, etc., fl. all the year; throughout the Philippines, very variable. Endemic.

5. **F. cumingii** Miq. Isis, Isis na puti (Tag.).

An erect shrub or small tree 2 to 8 m high, glabrous, or the young branchlets somewhat pubescent. Leaves opposite, linear to lanceolate or oblanceolate, slightly or decidedly scabrid, rough to the touch or sometimes nearly smooth, 8 to 20 cm long, acuminate, base usually acute and somewhat 3-nerved, margins entire or irregularly toothed, the nerves distant, distinct, spreading, interarching near the margins. Receptacles axillary, solitary or more often in pairs, peduncled, subglobose, 1 to 1.3 cm in diameter, smooth or somewhat roughened, brownish or reddish when mature.

In dry thickets, occasional, fl. all the year; widely distributed in the Philippines. Endemic.

6. **Ficus hauli** Blanco. Hauili (Tag.); Lagnob (Vis.).

An erect shrub or small tree, 3 to 8 m high, glabrous or the young shoots more or less pubescent. Leaves oblong-ovate to elliptic-ovate, smooth and shining, glabrous, not at all roughened, 10 to 20 cm long, apex rather sharply acuminate, base acute, nerves prominent, 10 to 12 pairs. Receptacles axillary, solitary, depressed-globose or turbinate, obscurely ridged or angled, 1.5 to 2 cm in diameter, shortly peduncled.

In thickets, occasional, fl. all the year; throughout the Philippines at low altitudes. Endemic.

7. **F. stipulosa** Miq. (*F. caulobotrya* Miq.). Balete (Tag.).

A deciduous tree 6 to 10 m high, starting as an epiphyte, glabrous throughout. Leaves smooth, glabrous and shining, oblong, acuminate, base usually rounded, entire, 12 to 20 cm long, the petioles 5 to 7 cm in length, the nerves spreading, distant, not prominent. Stipules membranaceous, pink, oblong, about 8 cm long, falling soon after the new leaves appear. Receptacles solitary, in pairs, or in fascicles in the axils of the leaves and in the axils of fallen leaves on the ultimate branchlets, short-pedicelled, globose, often in great abundance, about 5 mm in diameter, 3-bracteate at the base.

Old Botanic Garden, fl. June–July and probably in other months; widely distributed in the Philippines. Endemic.

*F. ELASTICA Roxb. India-rubber Tree.

A spreading, glabrous tree reaching a height of 10 m, normally starting as an epiphyte, sending down numerous adventitious roots from the trunk and larger branches. Leaves very coriaceous, smooth and shining, elliptic-oblong, sharply and slenderly acuminate, 15 to 25 cm long, entire, the nerves very numerous, dense, parallel; stipules deciduous, membranaceous, usually red, often as long as the leaves. Receptacles axillary, usually in pairs, sessile, smooth, greenish-yellow, about 1 cm long, oblong-ovoid.

Not uncommon in cultivation, fl. Jan.–March; in most large towns in the Philippines. Introduced from India.

9. **F. benjamina** L. Balete (Tag.).

A strangling fig, assuming a tree-form and reaching a height of 15 m or more, quite glabrous. Leaves coriaceous, 6 to 10 cm long, oblong-ovate, prominently and rather slenderly acuminate, quite entire, base rounded, smooth, green and shining, the nerves slender, spreading, not prominent; petioles 5 to 10 mm long. Fruits axillary, solitary, sessile, dark-purple and fleshy when mature, subglobose, about 1 cm in diameter.

Along streams, Masambong to San Francisco del Monte, occasional, in fruit Feb.–Apr.; widely distributed in the Philippines. India to Malaya.

10. **F. indica** L. Balete (Tag.).

An erect, glabrous shrub or tree 4 to 12 m high, starting as an epiphyte, strangling its supporting host and assuming a tree-form. Leaves coriaceous 5 to 12 cm long, shining, smooth, elliptic-ovate, entire, narrowed at both ends, base acute or somewhat rounded, more or less 3-nerved, apex acute or acuminate, the acumen sometimes blunt, the petioles 6 to 12 mm long, the primary nerves usually about 6 pairs, the secondary ones sometimes nearly as prominent and more numerous. Receptacles globose, axillary, solitary or in pairs, sessile, dark-purple and fleshy when mature, glabrous, 1 cm in diameter or less, the base with three small ovate bracts.

In dry thickets opposite Fort McKinley, fl. Nov.–Jan.; widely distributed in the Philippines. India to Malaya.

11. **F. concinna** Miq. Balete (Tag.).

A strangling fig, assuming a tree-like form, 5 to 10 m high, quite glabrous. Leaves entire, oblong to elliptic-oblong, smooth, green, shining, 6 to 11 cm long, acuminate, the petioles 1.5 to 3.5 cm long. Receptacles axillary, in pairs or solitary, globose, subsessile or shortly peduncled, pink, when mature becoming soft and fleshy, dark-purple, 7 to 8 mm in diameter, smaller when dry. (Fl. Filip. *pl. 382.*)

In thickets, Masambong to Pasig, occasional, fl. March–Apr.; widely distributed in the Philippines at low altitudes. Endemic.

2. ARTOCARPUS Forster

Trees with milky juice, the leaves alternate, coriaceous, entire or pinnately lobed, often large. Flowers monoecious, small, densely crowded on globose to oblong, solitary, lateral, axillary, or terminal receptacles. Male flowers: Perianth 2- to 4-lobed, the lobes obtuse, valvate or imbricate. Stamen 1, erect. Female flowers: Perianth tubular, connate, confluent below with the receptacle. Ovary straight; style central or lateral. Fruit large, globose to oblong, composed of numerous, greatly enlarged, fleshy perianths and carpels (anthocarps), their tips hardened, truncate, pyramidal, or spinous. Achenes deeply sunk in the fleshy mass, 1-seeded. (Greek "bread" and "fruit.")

Species 50 or more, tropical Asia to Polynesia, about 18 in the Philippines.

Leaves usually less than 15 cm long, mostly entire; fruit very large, borne on the trunk and larger branches, oblong, 25 to 60 cm long. 1. *A. integrifolia*

Leaves very large, deeply pinnately lobed; fruit globose to ovoid, borne on the twigs.. 2. *A. communis*

1. A. **INTEGRIFOLIA** L. f. Lanca, Nanca (Tag.); Jak-fruit.

A tree reaching a height of from 8 to 15 m. Leaves elliptic-oblong to obovate, entire or sometimes 3-lobed, shining, very shortly acuminate, base acute, 7 to 15 cm long, the stipules spathe-like, deciduous. Female heads from the trunk or large branches the males terminal or axillary, cylindric, 5 to 8 cm long, about 2.5 cm in diameter, when young enclosed by spathe-like, stipular sheaths. Sepals 2. Fruit green, oblong, very large, fleshy, edible, 25 to 60 cm long, the tips of the anthocarps pyramidal.

Commonly cultivated, fl. at all seasons; throughout the Philippines, cultivated and spontaneous. India to Malaya, but frequently only cultivated; certainly an introduced species in the Philippines.

*2. A. **COMMUNIS** Forst. (*A. incisa* L. f., *A. camansi* Blanco, *A. rima* Blanco). Rimas, Camansi (Tag.); Colo (Vis.); Pacac (Il.); Breadfruit.

A tree reaching a height of 15 m. Leaves very large, ovate to oblong, coriaceous, 40 to 50 cm long, or frequently much larger on young plants, some much smaller leaves frequently also present, somewhat pubescent or nearly glabrous, acuminate, deeply pinnately 3- to 8-lobed, the lobes lanceolate, acuminate; stipules large, deciduous. Male receptacle narrowly oblong-obovoid, cylindric, up to 15 cm long, yellowish. Fruit globose to ellipsoid, up to 20 cm in length, green, covered with the slightly projecting, rounded to conical tips of the anthocarps, the individual ones usually 5 mm in diameter or less, seedless (*A. rima*, Fl. Filip. *pl. 267*), or with ovoid to subglobose seeds about 2.5 cm in diameter (*A. camansi*, Fl. Filip. *pl. 457*.)

Not uncommon in cultivation, fl. all the year; throughout the Philippines, but neither form indigenous. Widely distributed in various forms in Malaya and Polynesia, variable in its fruit characters.

3. STREBLUS Loureiro

Trees with somewhat milky juice. Leaves alternate, harsh, rather finely toothed. Flowers axillary, small, dioecious or monoecious. Male flowers in small, short-peduncled heads. Sepals 4, imbricate. Stamens 4, inflexed in bud. Rudimentary ovary somewhat dilated above. Female flowers bracteate, solitary, or 2 to 4 together, pedicelled. Ovary straight, the style-arms elongated. Fruit fleshy, surrounded by the accrescent sepals, 1-seeded. (Greek "crooked" in reference to the often crooked branches.)

Species 2, India to Malaya, 1 in the Philippines.

1. **S. asper** Lour. Calios (Tag.); Alodig (Il.).

A rigid, densely branched tree 4 to 15 m high. Leaves oblong-ovate to subrhomboid, very scabrid, 4 to 12 cm long, finely toothed, obtuse to acuminate, base narrowed. Male heads solitary or in pairs, 4 to 7 mm in diameter, short-peduncled, globose, greenish-yellow or nearly white. Female flowers peduncled, usually in pairs, green, the sepals accrescent and nearly enclosing the fruit. Fruit ovoid, pale-yellow, 8 to 10 mm long, the pericarp soft, fleshy, the seed 5 to 6 mm long, ovoid. (Fl. Filip. *pl. 171.*)

Very common, fl. most of the year; throughout the Philippines. India to China and Malaya.

4. CASTILLOA Cervantes

Trees with abundant latex, and alternate, shortly petioled, large, entire or minutely toothed, distichous leaves. Male flowers: Perianth none. Stamens numerous, scattered among the numerous bractlets. Female flowers: perianth 3- to 6-lobulate. Ovary adnate to the perianth, stigma 2- to 5-branched; ovule solitary. Fruiting perianth enlarged, dry or fleshy, more or less adhering to the receptacle and to each other, and enclosing the rounded to oblong nutlets (achenes). (In honor of J. del Castillo, a Mexican pharmacist and explorer.)

Species 10, western America from Mexico to Peru and Bolivia, a single introduced one in the Philippines.

*1. C. ELASTICA Cerv. Castilloa Rubber Tree.

A tree reaching a height of 15 m, the branches spreading or depressed, the young one densely hairy. Leaves distichous, oblong, 20 to 45 cm long, 8 to 15 cm wide, acuminate, base cordate, rough, pubescent, entire, the nerves 17 to 20 pairs, prominent. Male receptacles shortly stalked, 1 to 1.5 cm long, 2 to 2.5 cm thick, lobed, the imbricating involucre-scales numerous, small, in about 6 rows. Fruiting receptacles large, about 4 cm in diameter, each with many red, fleshy fruits 1.5 to 2 cm long.

Occasionally cultivated, fl. all the year. A native of Mexico, now cultivated in many other tropical countries, of recent introduction here.

5. MORUS Linnaeus

Trees or shrubs with alternate, entire, toothed, or lobed leaves which are 3- or 5-nerved at the base, the stipules lateral, small, soon falling. Flowers monoecious or dioecious, spicate. Male flowers with 4 imbricate sepals; stamens 4, inflexed in bud; the rudimentary ovary turbinate. Female flowers with 4 sepals, which are imbricate, accrescent and fleshy in fruit. Ovary included, 1-celled; style 2-partite. Fruiting spikes or heads composed of many achenes enclosed in the succulent perianths. (The Latin name.)

Species few in tropical and temperate regions, 1 introduced in the Philippines.

1. **M. ALBA L.** Moral, Morera (Sp.-Fil.); Mulberry.

A dioecious or monoecious shrub or small tree 3 to 6 m high. Leaves ovate, acuminate, base cordate, 3-nerved, margins toothed, sometimes deeply 3-lobed, 5 to 20 cm long, slightly hairy along the nerves on the lower surface or nearly glabrous. Fruit axillary, peduncled, dark-purple or nearly black when mature, fleshy, edible, 1.5 to 2 cm long. (Fl. Filip. *pl. 206.*)

Not uncommon in Manila in cultivation, fl. all the year; found in many towns in the Philippines and naturalized in northern Luzon. Introduced from China at an early date for the purpose of feeding silkworms. India to China and Japan, cultivated in many other countries.

6. MALAISIA Blanco

A dioecious, climbing, nearly glabrous shrub. Leaves alternate, entire or toothed, penninerved. Male spikes dense, shortly peduncled, simple or slightly branched, short, axillary. Perianth 3- or 4-parted, the segments valvate. Stamens 3 or 4, the filaments inflexed in bud; rudimentary ovary small. Female flowers in small, axillary, solitary or fascicled, shortly peduncled heads, the flowers surrounded by bracteoles, 1 or 2 fertile, the others usually sterile. Perianth urceolate, mouth contracted. Ovary straight, included; style 2-fid, the branches filiform. Fruit 1 or 2 to each head, small, red, the pericarp thin, fleshy. (From the Tagalog name, *malaisis.*)

A monotypic genus.

1. **M. scandens (Lour.) K. Sch.** (*M. tortuosa* Blanco). Malaisis (Tag.).

A climbing shrub reaching a height of 4 to 8 m, glabrous except young branchlets and inflorescence. Leaves oblong-ovate to elliptic-oblong, smooth or somewhat rough, 4 to 10 cm long, entire or obscurely toothed, acute or acuminate, base rounded or acute, often slightly inequilateral, the nerves small, greenish, the female inflorescence densely pubescent. Fruit oval, 6 to 7 mm long, bright-red, sessile, 1 or 2 to each receptacle.

In dry thickets, Balintauac, near Fort McKinley, etc., fl. May–June; widely distributed in the Philippines. Southern China through Malaya to Australia and Polynesia.

7. CUDRANIA Trécul

Erect or climbing, dioecious, spiny shrubs with alternate, entire leaves, and small lateral stipules. Flowers in small, axillary, globose, peduncled heads. Male flowers: Sepals 3 to 5, oblong, obtuse, adnate to the bracts. Stamens 4, more or less adnate to the sepals. Female flowers: Sepals surrounding the ovary; style simple or 2-parted. Achenes enclosed by the fleshy bracts and perianth, forming a globose, fleshy head. (From its Malayan name.)

Species 3 or 4, India to Australia, 1 or 2 in the Philippines.

1. **C. javanensis** Tréc.

A scandent or straggling glabrous shrub 2 to 4 m in length, the branches armed with stout, sharp, straight or somewhat recurved spines, 1 to 1.5 cm long. Leaves elliptic-ovate to oblong-ovate or oblong-obovate, shortly acuminate, base rounded, 3 to 8 cm long, shining. Heads solitary or in pairs, globose, short-peduncled, the female ones 7 to 8 mm in diameter, yellowish, dense, in fruit fleshy and up to 5 cm in diameter. (Fl. Filip. *pl. 418.*)

In thickets Pasay, La Loma, etc., occasional, fl. Feb.–Aug.; widely distributed in the Philippines. Tropical Asia to eastern Africa, Malaya, and Australia.

8. FATOUA Gaudichaud

An erect, branched, often suffrutescent herb with alternate, toothed leaves. Flowers monoecious, in axillary, peduncled heads, the male and female ones intermixed, the outer bracts forming an irregular involucre. Perianth of the male flowers deeply 4-lobed. Stamens 4, inflexed. Rudimentary ovary very small. Perianth of the female flowers similar to that of the male, but the lobes narrower. Style lateral, tapering into a long, slender, papillose stigma with a tooth-like branch at the base; ovule pendulous. Fruit small, surrounded by the persistent perianth, slightly compressed, the pericarp thinly crustaceous.

A monotypic genus.

1. **F. japonica** (Thunb.) Blume (*F. pilosa* Gaudich.).

An ascending or erect, slightly branched, suffrutescent herb, the branches slender, terete, 50 cm high or less, slightly pubescent. Leaves ovate to ovate-lanceolate, acute or acuminate, base broad, truncate or somewhat cordate, 3-nerved, margins crenate-dentate, 2 to 6 cm long, 1 to 4 cm wide, widest at the base. Heads axillary, globose, solitary or in pairs, greenish-yellow, about 5 mm in diameter.

In rather dry places on cliffs, talus-slopes, etc., opposite San Pedro Macati, fl. all the year; widely distributed in the Philippines. Japan and China through Malaya to Australia and Polynesia.

37. URTICACEAE[1] (NETTLE OR LIPAY FAMILY)

Herbs, shrubs, or trees, sometimes with stinging hairs, with alternate, rarely opposite, often oblique leaves. Inflorescence cymose, clustered, spicate, or panicled, axillary or terminal. Flowers small, unisexual, monoecious or dioecious. Male flowers: Calyx equally or unequally toothed or divided. Petals none. Stamens as many as the calyx-lobes or fewer, inflexed in bud. Female flowers: Perianth much as in the male flowers. Ovary superior, 1-celled; style or stigma solitary; ovule one, erect. Fruit an achene.

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[1] For a consideration of all the known Philippine species of this family see Robinson, C. B., "Philippine Urticaceae." *Philip. Journ. Sci.* **5** (1910) *Bot.* 465–543; **6** (1911) *Bot.* 1–31.

Genera 44, species about 500, of wide distribution, but chiefly tropical, 21 genera, and about 130 species in the Philippines.

1. Erect shrubs or trees.
  2. Flowers in axillary fascicles........ 1. *Pipturus*
  2. Flowers paniculate or cymose.
    3. Vegetative parts with stinging hairs; fruit fleshy........ 2. *Laportea*
    3. No stinging hairs; fruit dry........ 3. *Boehmeria*
1. Spreading or erect herbs.
  2. Flowers cymose.
    3. A coarse, erect, branched herb with large leaves, the vegetative parts with stinging hairs........ 4. *Fleurya*
    3. A very small herb with small leaves and no stinging hairs.... 5. *Pilea*
  2. Flowers in axillary fascicles, or on sessile or peduncled fleshy receptacles.
    3. Flowers on a fleshy sessile or peduncled receptacle, involucrate; leaves strongly inequilateral........ 6. *Elatostema*
    3. Flowers in axillary fascicles, not involucrate; leaves equilateral or nearly so........ 7. *Pouzolzia*

1. PIPTURUS Weddell

Erect dioecious shrubs or trees. Leaves alternate, 3- or 5-nerved, the stipules bifid. Flowers small, in axillary clusters or the clusters spicately arranged. Male flowers: Perianth 4- or 5-fid, lobes valvate. Stamens 4 or 5. Female flowers on a somewhat fleshy receptacle. Perianth ovoid, narrowed to a minute mouth. Ovary adherent to the perianth; stigma elongated. Achenes small, surrounded by the accrescent fleshy perianths, forming a soft and fleshy fruit. (Greek "to fall" and "tail," in allusion to the inflorescence of some species.)

Species about 12, Mascarene Islands to Malaya, Australia, and Polynesia, 6 in the Philippines.

1. **P. arborescens** (Link) C. B. Rob. (*P. asper* Wedd.). Dalunot (Tag.).

A dioecious shrub or small tree 3 to 5 m high. Leaves ovate, 7 to 18 cm long, 3 to 10 cm wide, sharply acuminate, base rounded or somewhat cordate, the margins toothed, the upper surface green, only slightly pubescent, a little scabrid, the lower surface pale, rather densely and softly pubescent. Male flowers in dense, axillary fascicles, the styles greenish-white, exserted. Female flowers small, greenish, in dense, axillary, hemispheric heads 5 to 6 mm in diameter, the styles long-exserted. Fruit white, very soft and fleshy, depressed-globose, 1 cm in diameter or less, of many small achenes immersed in the fleshy perianths. (Fl. Filip. *pl. 371.*)

Common in thickets, fl. all the year; throughout the Philippines. Borneo.

2. LAPORTEA Gaudichaud

Trees or shrubs with few to many, often minute, stinging hairs. Leaves ample, entire or toothed. Flowers small, monoecious or dioecious, glomerate, in axillary panicles. Male flowers: Sepals 4 or 5. Stamens 5, inflexed in bud, the rudimentary pistil clavate or subglobose. Female flowers: Perianth segments 4, subequal. Ovary at length oblique. Achene oblique, flattened or compressed, seated on the perianth, usually fleshy. (In honor of F. L. de Laporte, a French entomologist.)

Species about 50, tropical Asia, Africa, and Australia, a few in North America, 16 in the Philippines, a single one in our area.

1. **L. meyeniana** (Walp.) Warb. Lipay, Lipang-calabao (Tag.).

A dioecious shrub or small tree 3 to 5 m high, with numerous, minute, very irritating, stinging hairs. Leaves ovate to broadly elliptic-ovate, 20 to 40 cm long, 10 to 22 cm wide, entire, shortly acuminate, base somewhat cordate, the upper surface green, glabrous, the lower surface paler, rather densely and softly pubescent; petioles 20 cm long or less. Male inflorescence axillary, paniculate, up to 20 cm long. Flowers very numerous, crowded in small glomerules on the branches, the perianth-segments about 2 mm long, the stamens about 3 mm long, somewhat spirally recurved. Female flowers at the ends of the branchlets of the inflorescence, 8 to 12, flabellately arranged, the individual inflorescences 5 to 7 mm in diameter. greenish. Fruit small, fleshy, pale-violet or white, 5 to 7 mm in diameter.

In thickets, San Pedro Macati, fl. Aug.–Nov.; widely distributed in Luzon and Mindoro. Endemic.

One of the worst of our nettle-like plants. The stinging hairs appear to be mostly along the margins of the leaves, and cause very painful blisters; the best remedy seems to be ammonia rubbed on the effected parts.

3. BOEHMERIA Jacquin

Shrubs, often with herbaceous branches, or small trees, with opposite or alternate, toothed, 3-nerved leaves, the stipules usually free. Flowers unisexual, in axillary, spiked, racemed, or panicled clusters. Male flowers: Perianth 3- to 5-lobed or parted. Stamens 3 to 5, inflexed in bud. Female flowers: Perianth tubular, 2- to 4-toothed, in fruit sometimes angled, winged, or swollen. Ovary included; stigma slender, persistent. Achene closely surrounded by the perianth, crustaceous, finally free. (In honor of G. R. Boehmer, a German botanist.)

Species about 50, chiefly tropical, 9 in the Philippines, a single introduced one in our area.

* 1. B. NIVEA (L.) Gaudich. Ramie.

An erect, branched, monoecious shrub, 1 to 2 m high, the branches and petioles hairy. Leaves all equal, long-petioled, broadly ovate, acuminate, coarsely toothed, the upper surface green, scabrid, with few scattered hairs, the lower surface very white, except the nerves, densely covered with appressed matted white hairs. Flowers small, clustered, the clusters arranged in axillary panicles shorter than the petioles. (Fl. Filip. *pl. 385.*)

Rarely cultivated in Manila, fl. in Nov. and probably in other months; occasional in Luzon and certainly introduced. Probably a native of China, now found in many tropical and subtropical countries in cultivation.

4. FLEURYA Gaudichaud

Annual erect herbs usually with few or many stinging hairs. Leaves alternate, toothed, 3-nerved. Flowers monoecious or dioecious, clustered, the clusters arranged in cymes or spikes. Male flowers: Sepals 4 or 5, ovate-lanceolate. Stamens 4 or 5, inflexed in bud. Rudimentary ovary globose or clavate. Female flowers: Calyx cupular, 4-lobed, or sepals 4, equal or very unequal. Ovary oblique; style ovoid or linear. Achene oblique, compressed, exserted, membranaceous. (In honor of J. F. Fleury, a French botanist.)

Species 8, of wide tropical distribution, 2 in the Philippines.

1. F. INTERRUPTA (L.) Gaudich. Lipang-aso, Lipang-castila (Tag.).

An erect, somewhat branched or simple, rather stout, annual herb 0.4 to 1.3 m high, the stems green, succulent, the vegetative parts with scattered, somewhat stinging, spreading hairs. Leaves ovate, acuminate, crenate or serrate, base broad, rounded or faintly cordate, 5 to 15 cm long, with scattered hairs on both surfaces, the petioles long. Inflorescence narrow, axillary, slender, up to 20 cm in length, of numerous, short, paniculately arranged cymes. Flowers crowded, greenish, small, intermixed with numerous pedicels of fallen flowers, the perianth of the pistillate ones 1 to 1.5 mm long; achenes straw-colored, compressed, 1.5 to 1.8 mm long.

Occasional in waste places, scattered, fl. all the year, but mostly in the rainy season, almost certainly introduced; widely distributed in the Philippines. India to China, Malaya, and Polynesia.

5. PILEA Lindley

Herbs, the leaves opposite, in equal or unequal pairs, entire or serrate, usually 3-nerved, the stipules connate into an intra-petiolar one. Flowers monoecious or dioecious, in axillary short- or long-peduncled, dense or dichotomously branched cymes. Male flowers: Sepals 2 to 4, free or connate at the base, often swollen or spurred at the back. Stamens 2 to 4. Rudimentary ovary conic or oblong. Female flowers: Sepals 3, rarely 4, very small, unequal, the dorsal one longest and sometimes swollen or hooded. Staminodes minute or none. Ovary straight; stigma sessile, penicillate. Achene ovoid or oblong, compressed, membranaceous or crustaceous. (Latin "felt cap" from a flower character in the original species.)

Species 170 or more, of wide tropical distribution, 13 in the Philippines, a single introduced species in our area.

1. P. MICROPHYLLA (L.) Liebm. (*P. muscosa* Lindl.). Gunpowder Plant.

An erect or ascending, simple, glabrous, annual, somewhat succulent, usually gregarious herb 10 cm high or less, stems slender, green or tinged with purple, angular. Leaves 2-ranked, petioled, the blades green, subelliptic, 2 to 5 mm long. Flowers in small, congested, subcapitate, nearly sessile, axillary cymes, the individual flowers greenish or tinged with red, less than 1 mm long.

Abundant on damp walls, etc., fl. throughout the year, but mostly in the rainy season; widely distributed in the Philippines. A native of South America, now introduced in various other tropical countries.

The common English name is derived from the fact that a clowd of pollen is discharged when the plant is shaken.

6. ELATOSTEMA Forster

Prostrate or erect, simple or branched herbs, sometimes suffrutescent. Leaves alternate, or a minute one often opposite the normal ones, distichous, sessile or subsessile, usually oblique or unequal-sided, mostly 3-nerved at the base or above it. Flowers very small, monoecious or dioecious, crowded on sessile or peduncled, axillary, unisexual, involucrate receptacles, the bracts rounded or oblong, the outer ones sometimes spurred. Female flowers: Sepals 4 or 5, 2 or more usually tubercled or spurred on the back. Stamens 4 or 5, inflexed in bud. Female flowers: Sepals 3 to 5, very minute, much shorter than the ovary. Achene minute, ellipsoid or fusiform, subtended by the very minute perianth. (Greek "drive" and "filament" from the elastic stamens.)

Species probably about 100, tropical Africa, Asia, through Malaya to Australia and Polynesia, 43 in the Philippines.

1. **E. luzonense** C. B. Rob.

An erect, annual, succulent, usually simple annual 10 to 50 cm high, glabrous but marked with cystoliths. Leaves alternate, distichous, mostly lanceolate and from 3 to 7 cm long, rather coarsely dentate, apex acuminate, base inequilateral, 3-nerved. Male receptacles axillary, peduncled, usually 5 to 6 mm in diameter, the perianth deeply 4-parted, the segments about 2 mm long. Female receptacles axillary, sessile or shortly peduncled, solitary or fascicled, up to 8 mm in greatest diameter, the perianth very minute, with 3 rounded lobes.

On damp cliffs, Guadalupe, near Fort McKinley, etc., fl. Sept.–Dec.; widely distributed in Luzon. Endemic.

7. **POUZOLZIA** Gaudichaud

Herbs or shrubs with alternate leaves, or the lower ones, rarely all, opposite, usually entire, 3-nerved, the upper ones gradually smaller. Flowers monoecious, rarely dioecious, in axillary fascicles. Male flowers: Perianth 4- or 5-lobed, rarely 3-lobed. Stamens 4 or 5, rarely 3. Rudimentary ovary oblong or clavate. Female flowers: Perianth tubular, 2- to 4-toothed. Ovary straight; stigma penicellate, the slender style jointed on top of the ovary. Achenes ovate, surrounded by the perianth-segments or slightly exserted. (In honor of P. C. M. de Pouzolz, a French botanist.)

Species about 35, tropics of the Old World, 4 in the Philippines.

1. **P. zeylanica** (L.) Benn. (*P. indica* Gaudich.).

A perennial, more or less prostrate or spreading herb, the stems terete, sometimes 1.5 m long, often less, the whole plant glabrous or more or less pubescent. Leaves lanceolate to ovate-lanceolate, entire, acuminate, thin, the base rounded or obtuse, 3-nerved, 2 to 7 cm long, mostly alternate. Flowers small, 4-merous, in axillary clusters, the staminate ones greenish or tinged with purple, the perianth 4-lobed, the stamens white, exserted, the pistillate ones in the same fascicles with the staminate ones. Fruit small, longitudinally ribbed, the style deciduous.

In low, open grass lands and waste places, common and very variable, fl. all the year; throughout the Philippines. India to China and Malaya.

38. LORANTHACEAE [1] (MISTLETOE FAMILY)

Parasitic evergreen shrubs. Leaves alternate, opposite, or whorled, entire, usually thick and coriaceous, sometimes wanting. Flowers perfect or 1-sexual, racemed, spicate, fascicled, or umbellate, usually axillary, bracteate and 2-bracteolate. Calyx adnate to the ovary, the limb truncate, rarely toothed, or none. Petals 4 to 8, free or connate, valvate. Stamens as many as the petals and opposite them, usually inserted on the petals. Ovary inferior, 1-celled; style long or short; ovule 1, adnate to the walls of the ovary. Fruit a 1-seeded berry or drupe.

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[1] For a consideration of the known Philippine representatives of this family see Merrill, E. D., "A Revision of Philippine Loranthaceae." *Philip. Journ. Sci.* 4 (1909) *Bot.* 129–153.

Genera 25 or more, species about 1,000, in all tropical countries, a few in temperate regions, 5 genera and about 60 species in the Philippines.

1. LORANTHUS Linnaeus

Branched, glabrous or pubescent, parasitic shrubs with opposite, whorled, or alternate, entire, leathery leaves. Flowers perfect, small to large, often colored and showy. Petals free or more or less connate into a cylindric or inflated tube, the tips above the insertion of the anthers spreading or reflexed. Stamens inserted on the corolla-lobes, the anthers erect, adnate. (Greek "thong" and "flower," in reference to the long petals of some species.)

Species about 500, mostly tropical, about 50 in the Philippines.

Leaves alternate; flowers in peduncled compound umbels.... 1. *L. haenkeanus*
Leaves whorled; flowers in fascicles.. 2. *L. merrittii*

1. **L. haenkeanus** Presl (*L. malifolius* Presl). Cansasayao (Tag.).

A nearly glabrous, coarsely branched parasitic shrub 0.5 to 1.5 m high. Leaves alternate, thickly coriaceous, lanceolate to oblong-ovate or ovate-lanceolate, 6 to 15 cm long, acuminate, acute, or obtuse, base acute or rounded. Flowers very numerous in dense, peduncled, lateral, compound, somewhat pubescent umbels, each branch of the umbel carrying one sessile, and two lateral short-pedicelled flowers. Flowers red, the corolla tubular, about 3 cm long, split about half-way to the base into 5 or 6 linear segments, the parts above the insertion of the stamens sharply reflexed. Fruit ovoid or ellipsoid, nearly 1 cm long. (Fl. Filip. *pl. 459, L. malifolius.*)

Parasitic on mango trees, Masambong, Santa Mesa, etc., fl. Dec.–Feb.; widely distributed on various trees in the Philippines. Endemic.

2. **L. merrittii** Merr. Dapo sa bacauan (Tag.).

A branched, glabrous shrub, 1 m high or less. Leaves coriaceous, oblong-obovate to broadly oblanceolate, rounded, 3 to 7 cm long. Flowers few, fascicled in the axils, shortly pedicelled or sessile, red, 12 to 13 mm long. Fruit ovoid, about 8 mm long.

On mangrove trees, occasional, fl. Apr.–June; occasional in the Philippines on various trees. Endemic.

39. OPILIACEAE (OPILIA FAMILY)

Shrubs or trees, sometimes woody vines, with alternate, simple, entire leaves, and small, regular, usually perfect flowers in simple or compound, axillary or terminal panicles, spikes, or racemes. Calyx small, not enlarged in fruit, 4- or 5-toothed or lobed. Petals 4 or 5, free or united, or none. Stamens as many as the petals or calyx-lobes. Ovary free or half-immersed in the disk, 1-celled, 1-ovuled. Fruit a drupe, the pericarp thin fleshy, the endocarp usually hard.

Genera 7, species about 20, mostly in the tropics of the Old World, few in America, 2 genera and 2 or 3 species in the Philippines.

1. CHAMPEREIA Griffith

Erect glabrous shrubs or small trees with alternate, entire leaves. Flowers minute, in few-flowered cymes which are arranged in axillary panicles, the bracts minute. Calyx-lobes 5, valvate. Petals none. Stamens 5, perigynous, opposite the lobes. Ovary superior, half immersed in the disk; stigma sessile, broad; ovule solitary, erect. Fruit an ellipsoid drupe.

Species 2 or 3, Tenasserim to Malaya, 1 in the Philippines.

1. **C. manillana** (Blume) Merr. Malalucban (Tag.).

An erect glabrous shrub 2 to 4 m high. Leaves shining, oblong to oblong-ovate, shortly petioled, 7 to 14 cm long, base acute or rounded, apex acute or somewhat acuminate. Panicles pale-green, slender, 4 to 10 cm long. Flowers pale-green or yellowish-green, about 2 mm long, the calyx-lobes oblong-ovate, acute, 1.5 mm long, spreading. Fruit glabrous, fleshy, ellipsoid, yellow or red, about 12 mm long, pericarp thin, seed large.

In thickets, occasional, fl. Jan.–March; widely distributed in the Philippines. Burma to the Malay Peninsula; Formosa.

40. OLACACEAE (OLAX FAMILY)

Erect or climbing shrubs, or trees, with alternate, simple, entire leaves. Flowers small, regular, perfect, in axillary racemes or cymes. Calyx small, truncate, or 4- to 6-toothed, accrescent and enclosing the fruit. Petals 3 to 6, free or coherent, valvate, sometimes cleft. Stamens 3 or more, opposite the petals, or alternate with them; staminodes twice as many as the stamens, often bifid, or none. Ovary superior, free, 1- to 5-celled, cells 1-ovuled; style simple. Fruit a drupe or nut-like, surrounded by the enlarged, often fleshy calyx.

Genera 26, species about 150 in the tropics of both hemispheres, 5 genera and 5 or 6 species in the Philippines.

OLAX Linnaeus

Climbing shrubs or trees with alternate, entire, simple leaves. Flowers in axillary, simple or branched racemes, the bracts small. Calyx small, cup-shaped, truncate or slightly toothed, accrescent and surrounding the fruit. Petals 3 to 6, hypogynous, valvate, somewhat coherent or free. Fertile stamens 3, the filaments attached near the base of the petals; staminodes usually 6, attached near the edges of the petals, bifid. Ovary superior, free, more or less 3-celled below, 1-celled above; style simple; stigma 3-lobed; ovules 3, pendulous. Fruit nearly covered by the fleshy accrescent calyx, the stone 1-celled, 1-seeded. (Latin "smelling" in allusion to the rank-scented wood of some species.)

Species about 30, tropics of the Old World, 1 in the Philippines.

1. **O. imbricata** Roxb. Malabaguio (Tag.).

A scandent shrub reaching a height of 10 m or more, or a small tree with pendulous branches, nearly glabrous. Leaves distichous, oblong-ovate, obtuse to acuminate, base rounded or acute, 6 to 15 cm long. Racemes puberulent, many-flowered, dichotomous, 1.5 to 3 cm long. Flowers white, the calyx truncate. Petals 3, free or nearly so, about 1 cm long, entire, or cleft at the apex. Stamens 3. Staminodes 6, bifid, nearly as long as the petals. Fruit orange to red when mature, ovoid, 1.5 to 2 cm long, quite surrounded by the fleshy calyx except at the apex. (Fl. Filip. *pl. 311.*)

In dry thickets near Fort McKinley, fl. Feb.–Apr.; widely distributed in the Philippines. Chittagong to Java.

41. ARISTOLOCHIACEAE (ARISTOLOCHIA FAMILY)

Herbs or shrubs, erect or climbing. Leaves alternate, entire, or 3- to 5-lobed; stipules none. Flowers perfect, small or large, regular or very irregular, terminal, axillary, or lateral, solitary, racemose, or cymose, bracteate or ebracteate. Calyx superior, regular and 3-lobed, or tubular and very irregular. Petals none or very rudimentary. Stamens 6 or more, inserted in a ring around the base of the style, anther-cells opening by dorsal slits. Ovary inferior, 4- to 6-celled; ovules numerous. Fruit capsular.

Genera 6, species over 200, in most tropical and in some temperate countries, 2 genera and 6 or 7 species in the Philippines.

1. ARISTOLOCHIA Linnaeus

Usually twining perennial herbs or sometimes shrubby. Leaves entire; petiole usually dilated at the base. Perianth variously colored, the tube inflated at the base then contracted, hairy within, the limb dilated, obliquely 1- or 2-lipped. Anthers 6, rarely 5, or more. Style short, 3- to 6-lobed. Capsule septicidally 6-valved or splitting through the placentas. (Greek "best" and "child-birth," from reputed medicinal properties of some species.)

Species about 180, chiefly tropical, 4 or 5 in the Philippines.

Leaves ovate; flowers racemose, small, narrow............................ 1. *A. tagala*
Leaves reniform; flowers solitary, large, broad; cultivated only.
2. *A. elegans*

1. A. tagala Cham. Timbangan, Mala-ube (Tag.).

A twining, suffrutescent, nearly glabrous vine. Leaves ovate to oblong-ovate, 8 to 20 cm long, acuminate, base deeply cordate, the sinus broad. Flowers in axillary racemes, the perianth purplish, rather slender, 3 to 3.5 cm long, the base inflated, globose, the tube somewhat curved, the mouth oblique. Capsule pendulous, ovoid, obovoid, or oblong-obovoid, 2 to 4 cm long, with a long stipe. (Fl. Filip. *pl. 104.*)

In thickets, Masambong to Fort McKinley, fl. March–October; widely distributed in the Philippines. India and Malaya.

*2. A. ELEGANS Mast.

A vine reaching a height of several meters. Leaves reniform, or triangular-reniform, up to 7 cm long and 10 cm wide, obtuse, base broadly cordate. Flowers solitary, the tube sharply curved, the lip expanded, concave, ovate-cordate, 6 to 7 cm in diameter, pale, with numerous purple spots. Capsule oblong-cylindric, longitudinally ribbed, 5 to 6 cm long, about 1.5 cm thick.

Occasionally cultivated for ornamental purposes, fl. Jan.–May. A native of Brazil, of recent introduction here.

42. POLYGONACEAE (SMARTWEED FAMILY)

Herbs, sometimes undershrubs, or somewhat woody vines. Leaves simple, alternate, entire (much reduced or wanting in *Muehelenbeckia*), the stipules usually scarious and sheathing the stems. Flowers usually perfect, sometimes dioecious, jointed on their pedicels. Perianth of 3 to 6, free or connate, persistent, usually accrescent and persistent sepals, often petaloid. Petals none. Stamens 5 to 8, rarely more or less, opposite the sepals. Ovary free, usually 2- to 4-angled, 1-celled, 1-ovuled. Fruit a small, 1-seeded nut, usually 3-angled and enclosed by the sepals.

Genera 30, species about 750 in all parts of the world, 3 or 4 genera and about 20 species in the Philippines.

Herbs with lanceolate leaves, the stipules sheathing the stems. 1. *Polygonum*
Tendril-bearing vines with cordate leaves.. 2. *Antigonon*
Leafless shrubs with flattened, striate, jointed branches bearing small fascicled flowers at the nodes.. 3. *Muehelenbeckia*

1. POLYGONUM Linnaeus

Glabrous or pubescent herbs with alternate, entire leaves, and membranaceous, tubular, sheathing stipules. Flowers perfect, small, clustered, the clusters arranged in cylindric or slender, spike-like, usually solitary, peduncled racemes; pedicels usually jointed; bracts and bracteoles tubular. Perianth 3- to 5-cleft, the outer 2 sepals usually smallest. Stamens usually 5 to 8, perigynous. Ovary usually 3-angled. Fruit usually 3-angled, included in the more or less enlarged calyx. (Greek "many" and "knee," from the numerous joints.)

Species about 200 in all warm regions, about 15 in the Philippines.

Nearly glabrous.. 1. *P. barbatum*
Densely pubescent.. 2. *P. tomentosum*

1. P. barbatum L.

An ascending, slightly pubescent or nearly glabrous plant 30 to 60 cm high, the stems often prostrate below. Stipules sheathing, cut into long, filiform cilia which are longer than the tube. Leaves lanceolate, acuminate, 10 to 15 cm long, glabrous or nearly so except the ciliate margins and midrib. Inflorescence terminal and in the upper axils, sparingly branched, the racemes erect, peduncled, 2 to 6 cm long, 5 to 7 mm in diameter, the bracts close, ciliate. Perianth white, or purplish, about 2 mm long.

Along the river near Fort McKinley, fl. Mar.–Apr., and probably in other months; throughout the Philippines. Tropical Asia, Africa, and Malaya.

2. P. tomentosum Willd.

An erect or ascending pubescent plant, the stems stout, about 1 cm in diameter, simple or sparingly branched, usually less than 1 m high. Leaves lanceolate, long-acuminate, softly pubescent, 12 to 20 cm long, the stipules thin, strigose, truncate, ciliate, surrounding the stems, 1.5 to 2 cm long. Racemes few, panicled, erect or slightly nodding, peduncled, 2 to 10 cm long, dense, cylindric, about 1 cm in diameter, each bract subtending several flowers. Flowers white, 4 mm long.

In open wet or damp places, occasional, fl. most of the year; throughout the Philippines. Tropical Asia and Africa, Malaya.

2. ANTIGONON Endlicher

Climbing, somewhat woody vines from thickened roots, with alternate, cordate leaves and somewhat stem-clasping petioles. Panicles axillary or terminal, the rachis extended as a tendril. Flowers perfect, white to deep-pink. Perianth 5-parted, persistent and somewhat enlarged in fruit, the outer 3 lobes larger than the inner 2. Stamens 7 or 8, filaments connate at the base. Ovary 3-angled. Nut 3-angled, smooth, enclosed by the persistent calyx-lobes.

Species 3 or 4 in Mexico and Central America, 1 now widely cultivated in tropical countries, introduced and extensively cultivated here.

Corculum leptopus (H.+A.) Stuntz.

*1. (A. LEPTOPUS Hook & Arn.) Cadena de amor (Sp.).

A scandent, somewhat woody, perennial vine from thickened tuberous roots, reaching a height of 10 m. Leaves ovate to oblong-ovate, 6 to 14 cm long, prominently reticulate, base deeply cordate, the lobes usually overlapping. Inflorescence terminal and in the upper axils, of paniculate racemes, the rachises of the racemes produced as tendrils. Flowers numerous, pale- to deep-pink, sometimes white, about 1 cm long, fascicled, secund, the perianth lobes somewhat enlarged, persistent, loosely surrounding the ovoid 1 cm long fruit. (Fl. Filip. *pl. 462, A. cordatum.*)

Very commonly cultivated for ornamental purposes, fl. all the year. A native of Mexico, now cultivated in many tropical countries.

3. MUEHELENBECKIA Meissner

Erect shrubs with flattened striate branches and much-reduced leaves (in our species), the sheaths reduced to transverse lines, making the branches appear jointed. Flowers small, dioecious or polygamo-dioecious, fascicled at the joints. Perianth deeply subequally 5-lobed. Stamens usually 8. Ovary 3-angled. Nut obtusely or acutely 3-angled, small, enclosed by the perianth. (In honor of H. G. Muehelenbeck, an Alsatian botanist.)

Species 15, Australia, Polynesia, South America and Mexico, 1 introduced in the Philippines.

1. M. PLATYCLADA Meissn.

An erect glabrous shrub 1 to 3 m high. Branches green, flattened, striate, 5 to 15 mm wide, the joints 5 to 20 mm long, bearing at the nodes few, reduced, lanceolate leaves 4 to 20 mm long, or the leaves nearly or quite wanting. Flowers whitish, small, about 2 mm long, fascicled, rarely solitary, alternating at the nodes. (Fl. Filip. *pl. 317, Exocarpus ceramica.*)

Occasionally cultivated, fl. all the year. A native of the Solomon Islands, now widely distributed in cultivation, introduced here and now naturalized in some localities.

43. CHENOPODIACEAE (GOOSEFOOT OR APOSOTIS FAMILY)

Herbs or shrubs with simple alternate leaves. Flowers perfect or unisexual, small, usually regular. Calyx of 3 to 5 free or connate sepals. Petals none. Stamens usually 5, opposite the sepals, perigynous or hypogynous. Ovary superior, 1-celled, 1-ovuled; stigmas 2 to 4. Fruit usually a utricle enclosed by the calyx.

Genera about 75, species about 550 in most parts of the world, represented in the Philippines by introduced forms only.

1. CHENOPODIUM Linnaeus

Erect, sometimes aromatic, branched herbs, with angled stems and alternate, entire, lobed, or toothed leaves. Flowers small, regular, perfect in axillary and terminal, simple or panicled, spikes. Calyx inferior, the sepals 5 or fewer, persistent. Stamens as many as the sepals, hypogynous or somewhat perigynous; filaments distinct, anthers introrse. Ovary 1-celled, free, usually depressed; styles 2 or 3. Fruit a membranaceous utricle enclosed by the calyx. (Greek "goose" and "foot," in allusion to the shape of the leaves of some species.)

Species about 50, of wide distribution, 2 introduced in the Philippines.

1. C. AMBROSIOIDES L. Aposotis (Sp.-Fil.).

An erect or ascending branched herb often nearly 1 m high, with angled stems, glabrous or glandular-pubescent, with a rank aromatic odor when crushed. Leaves oblong to oblong-lanceolate, 3 to 10 cm long, repand-dentate or undulate. Flowers small, spicate. Sepals 5, sometimes only 3. Utricle less than 1 mm long. (Fl. Filip. *pl. 69.*)

Quite frequently cultivated by the natives and occasionally spontaneous, fl. March–Apr., and probably in other months; widely distributed in the Philippines and in tropical and temperate countries generally, a native of tropical America.

In addition to the above, the common beet, *Beta vulgaris* L., (Sp., *remolacha*), a native of Europe, also belonging to this family, is cultivated by Chinese gardeners for the Manila markets.

44. AMARANTHACEAE (AMARANTHUS OR COLITES FAMILY)

Herbs, sometimes climbing, rarely shrubby (*Deeringia*). Leaves opposite or alternate, exstipulate. Flowers in axillary clusters or in simple or panicled spikes, racemes, or heads, the bracts and 2 bracteoles scarious. Sepals 5, sometimes 1 to 3, rigid or scarious, persistent, imbricate in bud. Petals none. Stamens 1 to 5, opposite the sepals, free or connate below, often with intervening membranaceous staminodes, all united into a cup; anthers 1- or 2-celled. Ovary 1-celled; styles 1 to 3; ovules 1 or more, basal. Fruit a utricle, rarely a berry (*Deeringia*) or capsular, indehiscent or circumsciss. Seed orbicular or ovate, usually compressed.

Genera 54, species about 450, in all temperate and tropical countries, 10 genera and about 20 species in the Philippines.

1. Climbing shrubs; ovules 2 or more; fruit fleshy, berry-like.. 1. *Deeringia*
1. Herbs.
  2. Ovules 2 or more; fruit membranaceous.......................... 2. *Celosia*
  2. Ovules 1.
    3. Anthers 1-celled; flowers in sessile or peduncled heads.
      4. Heads peduncled, subtended by 2 leafy bracts; style long; stigma 2-fid.......................... 3. *Gomphrena*
      4. Heads sessile or subsessile, solitary or clustered; stigma subsessile, capitate.......................... 4. *Alternanthera*
    Anthers 2-celled; inflorescence various.
      4. Staminodes none.

5. Leaves alternate.. 5. *Amaranthus*
5. Leaves opposite.. 6. *Pupalia*
4. Staminodes present.
5. Perfect flowers 1 to 3 in each cluster, surrounded by several to many deformed ones.. 7. *Cyathula*
5. Flowers all perfect, no deformed ones.
6. Sepals short, hyaline, woolly.. 8. *Aerua*
6. Sepals subulate-lanceolate, awned, shining, finally hardened. 9. *Achyranthes*

1. DEERINGIA R. Brown

Rambling or climbing shrubs with alternate petioled leaves. Flowers small, 1- or 2-sexual, in simple or panicled spikes. Sepals 5, oblong, spreading in fruit. Stamens 4 or 5; staminodes none. Ovary ovoid or subglobose; ovules few to many; stigmas 2 or 4. Fruit a globose or ovoid, fleshy, red or white berry. (In honor of Dr. Charles Deering.)

Species 5 or 6, tropical Asia to Australia and Polynesia, 2 in the Philippines.

1. **D. baccata** (Retz.) Moq.

A scandent, slightly pubescent or nearly glabrous vine, reaching a length of 5 to 6 m, the branches drooping. Leaves ovate to oblong-ovate, entire, 7 to 14 cm long, acute or acuminate, base subtruncate. Racemes slender, elongated, 20 to 40 cm long, in the upper axils, forming drooping, leafy panicles. Flowers numerous, shortly pedicelled, greenish-white, the perianth-segments about 1.5 mm long, reflexed. Stamens white, erect. Fruit ovoid, fleshy, red, about 4 mm long. (Fl. Filip. *pl. 236.*)

In thickets, occasional, fl. Oct.–Jan.; widely distributed in the Philippines. India to China, southward to Australia.

2. CELOSIA Linnaeus

Erect, simple or branched herbs, with alternate leaves. Flowers clustered or spicate, white, pink, purple, or yellowish, shining. Sepals dry, striate or ribbed. Stamens 5, united below into a cup; anthers 2-celled; staminodes none. Utricle circumsciss. (Greek "a burning," in allusion to the seared look of the flowers.)

Species about 30 in most tropical countries, 2 introduced in the Philippines.

1. C. ARGENTEA L.

An erect, coarse, simple or branched, glabrous, annual herb 0.5 to 1.5 m high. Leaves linear to lanceolate, 4 to 14 cm long. Spikes solitary, erect, stout, dense, white or pink, ovoid to oblong-linear, 3 to 30 cm long, about 1.5 cm thick, usually numerous, the flowers white or pale-pink, shining. Sepals about 6 mm long, acute or acuminate, the bracts shorter; style elongated after flowering. Seeds shining, about 1.5 mm in diameter.

In fallow lands, cultivated ground, etc., fl. Aug.–Feb.; widely distributed in the Philippines but certainly introduced. All tropical countries, probably a native of tropical America.

In addition to the above the Cock's Comb (*Celosia cristata* L.) is not uncommonly cultivated for ornamental purposes (Fl. Filip. *pl. 64*); it is exceedingly variable with usually broader leaves than *C. argentea*, and with yellow, pink, red, or purple flowers, the tips of the spikes variously fasciated. It has not been found as a spontaneous plant here. Tropics generally, cultivated and as an escape.

3. GOMPHRENA Linnaeus

Erect, branched, hirsute or villous herbs, the nodes usually thickened. Leaves opposite. Flowers in peduncled heads, white or purple. Sepals 5, lanceolate, acuminate. Stamens 5; filaments united into a long tube, cleft at the top, usually without staminodes. Ovary 1-celled, 1-ovuled; style short or long; stigmas 2. Utricle compressed, indehiscent. (From the Greek name of an allied plant.)

Species about 70 in South America and Australia, the following now cosmopolitan in the tropics.

1. G. **GLOBOSA** L. Botoncillo (Sp.-Fil.).

An erect, branched, pubescent annual, the branches more or less thickened and often purplish at the nodes. Leaves petioled, oblong, acute or obtuse, 7 to 11 cm long. Flowers numerous, densely crowded in globose heads, the heads white, pink, or purple, solitary, peduncled, 1.5 to 2 cm in diameter, subtended by 2 leafy bracts. Bracteoles 8 to 10 mm long, enclosing the flowers, lateral, keeled. Sepals pubescent. (Fl. Filip. *pl. 68.*)

Commonly cultivated for ornamental purposes, occasionally spontaneous, fl. all the year. Undoubtedly a native of tropical America, now wild or cultivated in most warm and tropical countries.

4. ALTERNANTHERA Forskal

Prostrate or spreading branched herbs with opposite leaves. Flowers small, white, in axillary, sessile or subsessile, solitary or clustered heads. Sepals unequal, three flattened, the inner and lateral two concave. Stamens 2 to 5, filaments short, connate into a short cup, with or without alternating staminodes; anthers 1-celled. Ovary 1-celled, 1-ovuled; stigma subsessile. Utricle compressed, ovoid to obcordate, margins often winged or thickened. (Latin "alternate" and "anther.")

Species about 16 in most tropical and subtropical countries, 3 or 4 in the Philippines.

1. Glabrous or nearly so.
    2. Spreading; leaves elliptic-lanceolate to linear-lanceolate, green. 1. *A. sessilis*
    2. Usually erect; leaves spatulate to oblong-obovate; cultivated plants, the leaves variegated with red.. 2. *A. versicolor*
1. Younger parts and heads rather densely hirsute.............. 3. *A. frutescens*

1. A. **SESSILIS** (L.) R. Br.

A spreading or prostrate much-branched herb, the branches up to 60 cm long, the ultimate ones with 2 lines of hairs on the internodes, the flowering ones ascending. Leaves glabrous or nearly so, elliptic-lanceolate to linear-lanceolate, acute or obtuse, sessile, obscurely toothed. Heads axillary, solitary or clustered, globose to oblong, white, 5 to 7 mm long. Sepals lanceolate, acute or acuminate, 2 to 2.5 mm long. Stamens 2 or 3. Utricle broadly obcordate.

In open waste places, common, fl. all the year; throughout the Philippines. Tropics generally.

*2. A. VERSICOLOR Regel.) Cucharitas (Sp.-Fil.).

A slender, erect or ascending, much-branched, nearly glabrous herb, the stems reddish, often prostrate below, 20 to 60 cm long. Leaves oblong-obovate to spatulate, acute or obtuse, long-petioled, the blades 1 to 6 cm long, green and red or purplish. Heads axillary, sessile, solitary, ovoid to subglobose, 5 to 7 mm long, somewhat hairy.

Commonly cultivated, fl. all the year; now found in cultivation in most large towns in the Philippines. Probably a native of Brazil.

3. A. FRUTESCENS (L'Her.) R. Br.

A wide-spreading, branched, prostrate, perennial herb, the stems rooting at the lower nodes, the branches up to 60 cm in length, the flowering ones ascending, the younger ones clothed with long, appressed, weak, white hairs. Leaves opposite, or the upper ones somewhat whorled, oblong to oblong-oblanceolate or spatulate, petioled, 1 to 2.5 cm long, acute or obtuse, entire, base gradually narrowed. Heads axillary, solitary or clustered, white, globose to ovoid, 5 to 10 mm long. Anthers 5. Sepals lanceolate, acuminate, about 5 mm long. Utricle compressed, obovoid, about 2 mm long.

In open waste places, fl. all the year, common about Manila. A native of tropical America, now thoroughly naturalized here, but not reported from any other part of the Orient.

5. AMARANTHUS Linnaeus

Erect, branched, annual herbs with alternate leaves. Flowers small, unisexual, in dense axillary clusters or in erect or drooping, densely or laxly panicled, spike-like clusters. Sepals 5, or 1 to 3, ovate to linear, often aristate. Stamens 1 to 5, free; staminodes none. Ovary compressed; style short or none; ovule 1. Fruit a compressed, indehiscent or circumsciss utricle. Seed orbicular. (Greek "unfading.")

Species many in all warm and tropical countries, 5 or 6 in the Philippines.

1. Spiny in the leaf-axils.. 1. *A. spinosus*
1. Spineless.
    2. Sepals and stamens 5; bracts setaceous or awned............ 2. *A. caudatus*
    2. Sepals and stamens 2 or 3; bracts subulate.
        3. Plant dull-purple or reddish, 1 to 1.5 m high; leaves acuminate. 3. *A. gangeticus*
        3. Plant green, 0.3 to 0.6 m high; leaves obtuse, often notched. 4. *A. viridis*

1. A. SPINOSUS L.

A stout, erect, glabrous, branched annual 0.4 to 1 m high, armed with slender, axillary spines. Leaves long-petioled, oblong to oblong-ovate or elliptic-lanceolate, obtuse, 4 to 10 cm long. Flowers about 1 mm long, in axillary clusters and in elongated terminal and axillary, usually densely flowered spikes, green or greenish-white, the setaceous bracts as long as or exceeding the five sepals.

In waste places, gardens etc., fl. all the year; throughout the Philippines, but certainly introduced. Most tropical countries.

2. A. CAUDATUS L.

An erect, stout, branched, unarmed, annual herb 1 to 2 m high, sparingly pubescent or nearly glabrous, all parts usually reddish-purple. Lower leaves long-petioled, oblong-ovate to ovate-lanceolate, acuminate, up to 25 cm long, the upper ones similar but smaller. Inflorescence terminal and in the upper axils, paniculate, the panicles 15 to 30 cm. long, the primary branches very numerous, 10 to 15 cm long, densely flowered. Flowers about 1.5 cm long. Sepals oblong to oblong-obovate, apiculate, shorter than the caudate-acuminate bracts. Stamens 5. Utricle 3-toothed at the apex, circumsciss, exceeding the calyx. Seed brown or black, shining, about 1 mm in diameter, the margins round. (Fl. Filip. *pl. 430, A. paniculatus.*)

Cultivated for its ornamental foliage, fl. all the year. In various tropical and subtropical countries in both hemispheres, wild and cultivated; introduced in the Philippines.

3. A. GANGETICUS L.

A coarse, erect, unarmed, glabrous, much-branched herb 1 to 1.5 m high, the vegetative parts often dull-purplish or reddish. Leaves long-petioled, broadly ovate, acute or shortly acuminate, base long-decurrent-acuminate, 5 to 12 cm long. Clusters of flowers in the lower axils, and forming elongated spikes which are cylindric, somewhat interrupted, up to 10 cm long and 1 cm in diameter. Bracts about 4 mm long, lanceolate, awned-acuminate. Sepals lanceolate, acuminate. Stamens 3. Utricle circumsciss, shorter than the sepals. Seed black, shining, about 1.2 mm in diameter. (Fl. Filip. *pl. 289, A. cruentus.*)

Occasionally cultivated, fl. July–Dec., and probably in other months; not spontaneous in our area, although so found in some parts of the Philippines, certainly introduced. Tropics generally, cultivated and in cultivated ground.

4. A. VIRIDIS L. Colites (Tag.).

An erect, glabrous, branched, unarmed annual 30 to 60 cm high. Leaves long-petioled, 4 to 10 cm long, ovate, obtuse, tip usually notched, base truncate or decurrent. Inflorescence of terminal and axillary, simple or panicled, interrupted spikes. Flowers very small, densely disposed, green, about 1 mm long. Seed brown or black. (Fl. Filip. *pl. 262, Euxolus caudatus.*)

In open waste places, cultivated grounds etc., common, fl., all the year; throughout the Philippines, but probably introduced. All tropical and warm countries.

6. PUPALIA Jussieu

Herbs or undershrubs with opposite leaves. Flowers perfect or imperfect, in spicate clusters, the imperfect ones reduced to awns bearing stellately spreading hooked bristles. Sepals 5, acuminate, 3- to 5-nerved. Stamens 5, nearly free below; anthers 2-celled; staminodes none. Ovary ovoid; style slender. Fruit an ovoid, compressed, indehiscent utricle.

Species 3 in tropical Asia and Africa, 1 in the Philippines.

1. P. ATROPURPUREA (Lam.) Moq.

A slender, erect, straggling, glabrous or sparingly pubescent annual herb 0.5 to 1.5 m high. Leaves opposite oblong-ovate, acuminate, base narrowed, petioled. Spikes terminal, 5 to 30 cm long, slender, the clusters of flowers remote, bracteate, woolly. Bristles of the imperfect flowers brown or purplish, stellately arranged, slender, hooked at the ends.

In thickets along roads and trails, San Pedro Macati, Pasay, etc., fl. Aug.–Nov.; widely distributed in the Philippines, surely introduced. Tropical Asia, Africa, and Malaya.

7. CYATHULA Loureiro

Prostrate or ascending herbs with opposite leaves. Flowers clustered, the clusters spicate, reflexed in fruit. Perfect flowers 1 or 2 in each cluster, surrounded by imperfect ones reduced to sepals and with rigid hooked awns. Sepals 5, 1-nerved, acuminate. Stamens 5, connate, united below with the retuse or 2-fid staminodes. Ovary obovoid, ovules 1, pendulous. Fruit a small, ovoid, indehiscent utricle. (Diminutive of Greek "cup.")

Species about 10, of wide tropical distribution, the following in the Philippines.

1. C. PROSTRATA (L.) Bl. Dayang (Tag.).

An annual branched herb, the stems prostrate and creeping below, reaching a length of 1 m or more, the branches erect or ascending. Leaves rhomboid-oblong, 2 to 8 cm long, acute or obtuse, gradually narrowed from the middle to the acute base, nearly sessile. Spikes terminal and axillary, slender, peduncled, 5 to 20 cm long. Clusters of flowers numerous, ovoid, about 3 mm long, greenish. Sepals pubescent.

In thickets, occasional, fl. Nov.–Feb.; common and widely distributed in the Philippines. Tropics generally.

8. AERUA Forskal

Woolly herbs or undershrubs, sometimes climbing. Leaves alternate or opposite. Flowers small in solitary or panicled spikes or in sessile axillary heads. Sepals 4 or 5, short, thin, all or only the inner ones woolly. Stamens 4 or 5, connate below, with interposed linear staminodes; anthers 2-celled. Fruit an indehiscent or circumsciss utricle.

Species about 10 in tropical Asia, Malaya, and Africa, 2 in the Philippines.

1. A. LANATA (L.) Juss.

An ascending or prostrate densely grayish-pubescent herb, the stems 0.2 to 0.8 m in length, simple or branched. Leaves alternate, petioled, elliptic to orbicular or obovate, obtuse, 1 to 3.5 cm long. Spikes numerous, white, axillary, solitary or crowded in the axils, densely flowered, 1 cm long or less, the flowers green and white, 2 mm in diameter. (Fl. Filip. *pl. 354.*)

In open dry lands, common locally, fl. all the year; throughout the Philippines at low altitudes, undoubtedly introduced. Africa, India, and Malaya.

9. ACHYRANTHES Linnaeus

Coarse herbs with opposite leaves, the flowers in simple or panicled spikes, deflexed immediately after opening, the bracts and bracteoles spinescent. Sepals 4 or 5, the filaments connate at the base, the staminodes square, toothed or fimbriate. Ovary oblong, 1-ovuled. Utricle oblong or ovoid, indehiscent. (Greek "chaff" and "flower.")

Species 12 in tropical and subtropical countries, 1 or 2 in the Philippines.

1. A. **ASPERA** L.

A coarse, rambling or erect, distantly branched, annual herb, 0.5 to 2 m high. Leaves oblong-obovate to elliptic or obovate, 6 to 15 cm long, acuminate, base narrowed, more or less pubescent or nearly glabrous. Spikes rigid, elongated, 10 to 50 cm long. Flowers green, 5 mm long, the stamens and staminodes pale-purplish, the staminodes fimbriate. Buds ascending, flowers spreading, immediately after flowering reflexed and closely appressed to the rachis.

In waste places, fl. all the year; throughout the Philippines, certainly introduced. Most tropical countries.

45. NYCTAGINACEAE (PISONIA OR MALUCO FAMILY)

Herbs, shrubs, or trees, or sometimes woody spiny vines. Leaves simple, opposite or alternate, entire, exstipulate. Inflorescence various, usually of terminal or axillary corymbs or cymes, the flowers often involucrate. Flowers perfect or unisexual. Calyx-tube long or short, cylindric or funnel-shaped, persistent and enveloping the fruit, the limb 3- to 10-toothed or lobed, sometimes petal-like. Petals none. Stamens 1 to many, hypogynous, the filaments usually unequal. Ovary superior, free, 1-celled; ovule 1; stigma simple or multifid. Fruit usually membranaceous, sometimes hard, usually enclosed in the more or less hardened, coriaceous or fleshy perianth-tube.

Genera 19, species about 175, chiefly in tropical America, 4 genera and about 10 species in the Philippines.

1. Glabrous unarmed shrubs or trees or more or less spiny woody vines.
    2. Flowers small, without involucres, the bracts minute............ 1. *Pisonia*
    2. Flowers medium, inserted on the midribs of the large, colored, persistent, showy bracts............ 2. *Bougainvillea*
1. Herbs.
    2. Flowers large, showy, involucrate............ 3. *Mirabilis*
    2. Flowers very small, bracteolate............ 4. *Boerhaavia*

1. PISONIA Linnaeus

Erect unarmed shrubs or trees or scandent and armed with curved spines. Leaves opposite or alternate, entire. Flowers in corymbose axillary and terminal cymes, usually dioecious, bracteolate. Perianth 5- to 10-toothed, of the male flowers funnel-shaped, of the female ones tubular. Stamens 6 to 10, exserted. Ovary sessile, oblique. Fruit oblong, muricate or angled, glandular. (In honor of W. Piso, an early writer on the medicinal plants of Brazil.)

Species about 60, tropical, few in Africa, about 6 in the Philippines.

A scandent shrub, armed with curved spines; leaves 6 to 10 cm long. 1. *P. aculeata*

An erect unarmed tree, the leaves very pale-green, 12 to 25 cm long. 2. *P. alba*

1. **P. aculeata** L.

A large scandent shrub, glabrous or sparingly pubescent, the branches pendulous, armed with solitary, axillary, recurved spines which are 1 cm long or less. Leaves ovate-oblong to elliptic, shining, 6 to 10 cm long, obtuse or obscurely acuminate, base acute. Inflorescence axillary and terminal, peduncled, of densely flowered corymbose cymes. Flowers yellowish-white, the males 4 to 5 mm in diameter. Fruit narrowly oblong or clavate, 5-ribbed, 7 to 14 mm long, viscid, the ribs muricate with several rows of glands. (Fl. Filip. *pl. 394.*)

In thickets, Masambong, fl. Jan.–Feb.; widely distributed in the Philippines. Tropics generally.

*2. P. ALBA Spanoghe. Coles-maluco; Maluco (Tag.).

An erect, unarmed, glabrous or nearly glabrous tree reaching a height of 10 m. Leaves thin, very pale-green or often nearly white when young, oblong-ovate, acuminate, base rounded, 12 to 25 cm long. Cymes terminal, dense, corymbose, the male flowers white or greenish-white, about 6 mm long, the female ones smaller. Fruit long-pedicelled, club-shaped, 5-angled, the angles with one row of prickles. (Fl. Filip. *pl. 44, Cordia ? olitoria.*)

Frequently cultivated for its ornamental, pale foliage, but rarely or never producing flowers in Manila. A native of Malaya, now cultivated in India and Ceylon.

2. BOUGAINVILLEA Commerson

Climbing spiny vines with alternate leaves. Inflorescence axillary or terminal, showy, the flowers inserted below the middle of the large colored bracts which are borne in threes. Perianth tubular, slightly curved, the lobes 5 or 6, short, spreading. Stamens 7 or 8, equal, included. Ovary stipitate, narrowly fusiform. Utricle stipitate, cylindric or clavate. (In honor of A. de Bougainville, a French navigator.)

Species 7, in tropical America, 1 now cultivated in all tropical and subtropical countries.

*1. B. SPECTABILIS Willd.

A stout, climbing, spiny, slightly pubescent or nearly glabrous woody vine, reaching a height of 15 m, with long drooping branches. Leaves ovate, 6 to 10 cm long, acuminate, base usually rounded, each axil with a stout, slightly curved, sharp spine 5 to 8 mm long. Flowers in the upper axils, forming a terminal leafy inflorescence. Cymes peduncled, trichotomous, the flowers in groups of threes on the ultimate branches, each group of flowers subtended by three, large, thin, persistent, colored, oblong-ovate, acuminate 2.5 to 4 cm long bracts. Flowers salver-shaped, inserted on the midrib of the bracts, the tube slender, about 2 cm long, greenish, angled, inflated below, the limb white, 5 to 7 mm in diameter.

Frequently cultivated, but not spontaneous, fl. Oct.–March. A most striking ornamental, a native of Brazil, now cultivated in many other tropical countries.

3. MIRABILIS Linnaeus

Glabrous or glandular herbs, the branches forked. Leaves opposite, the lower ones petioled, the upper often sessile. Involucres 1- to many-flowered, calyx-like, the 6 lobes imbricate, not enlarged after flowering, usually arranged in dense cymes. Perianth-tube elongated, white or colored, constricted above the ovary, the limb 5-lobed, petal-like. Stamens 5 or 6, unequal in length, exserted. Ovary ellipsoid or ovoid; style filiform, exserted; stigma capitellate. Utricle obovoid, coriaceous. (Adapted from the Latin "wonderful.")

Species about 25, in tropical America, 1 now cultivated in many warm countries.

1. M. JALAPA L. A las cuatro, Oraciones (Sp.-Fil.); Four-o'clock, Marvel of Peru.

An erect, nearly or quite glabrous, branched plant 20 to 80 cm high. Leaves 4 to 10 cm long, narrowly ovate, acuminate, base often subtruncate and somewhat inequilateral. Involucres crowded, calyx-like, 1 cm long or less, 1-flowered. Perianth white, purple, or yellow, the tube cylindric, slightly enlarged upward, 3 to 4 cm long, the limb spreading. Fruit narrowly ovoid, about 8 mm long, black, finely ribbed.

Commonly cultivated, fl. all the year; throughout the Philippines, in and about towns, cultivated and naturalized. A native of tropical America, now cultivated in many warm countries.

4. BOERHAAVIA Linnaeus

Diffuse spreading herbs with divaricate branches and opposite leaves. Flowers small, jointed on their pedicels, panicled or umbellate, bracteolate. Perianth-tube funnel-shaped, short, 5-lobed. Stamens 1 to 5, unequal exserted. Ovary oblique, stipitate. Fruit small, glandular, 5-ribbed, the utricle oblong. (In honor of H. Boerhaave, an early Dutch botanist.)

Species 25 or more, in tropical and subtropical regions of both hemispheres, a single variable one in the Philippines.

1. B. DIFFUSA L.

A diffuse, spreading, laxly branched, glabrous or somewhat pubescent herb, the branches sometimes 2 m in length. Leaves scattered, ovate, elliptic, or oblong, sometimes undulate, pale beneath, 1 to 4 cm long, apex rounded or acute, base usually rounded. Cymes very lax, panicled, the branches slender, flowers usually fascicled or subumbellate on the ultimate branchlets, pink, about 1.5 mm long. Fruit glandular, narrowly oblong-obovoid, about 3 mm long. (Fl. Filip. *pl. 93.*)

In waste places, occasional, surely introduced, fl. Sept.–May; widely distributed in the Philippines. Tropical Asia to Polynesia.

46. AIZOACEAE (MOLLUGO OR TOSTON FAMILY)

Herbs with entire, simple, alternate, opposite, or whorled leaves. Flowers in axillary or terminal clusters or cymes, small, regular, perfect. Calyx of 4 or 5 nearly free or more or less united segments, usually persistent. Petals none. Stamens perigynous or hypogynous, few or many. Ovary free, 2- to 5-celled, of 2 to 5 united carpels; styles as many as the carpels; ovules usually many, rarely few or one in each cell, axile. Fruit capsular, circumsciss or dorsally dehiscent. Seeds numerous, small.

Genera 7, species 52, chiefly in Africa, a few in most tropical and subtropical countries, 3 genera, and 5 species in the Philippines.

1. Capsule circumsciss; stamens inserted on the calyx-tube.
   2. Ovary and capsule 3- to 5-celled.. 1. *Sesuvium*
   2. Ovary and capsule 1- or 2-celled.. 2. *Trianthema*
1. Capsule dehiscing dorsally; stamens inserted on the receptacle. 3. *Mollugo*

1. SESUVIUM Linnaeus

Prostrate or spreading, succulent, branched herbs. Leaves opposite, very fleshy, entire. Flowers small, axillary, solitary. Calyx-tube short, the lobes 5, persistent. Stamens few or many, inserted near the top of the calyx-tube. Ovary free, 3- to 5-celled; styles 3 to 5; ovules many. Fruit an ovate-oblong, membranaceous, 3- to 5-celled, circumscissly dehiscent capsule. (An unexplained name.)

Species 4, along the seashores of warm countries, 1 in the Philippines.

1. **S. portulacastrum** L. Dampalit (Tag.).

A fleshy, prostrate, spreading, branched herb, the stems rooting at the nodes, often reddish, 20 to 50 cm in length, with short ascending branches. Leaves oblong-linear to linear, green, fleshy, very thick, 2 to 4 cm long, the petioles short, dilated below and clasping the stems by their thin margins. Flowers small, shortly pedicelled. Calyx pink or red within, the segments 5 to 6 mm long, cuspidate. Capsule about 5 mm long.

Along the banks of tidal streams, etc., Maypajo, fl. May and probably in other months; along the seashore throughout the Philippines. Most tropical and subtropical seashores.

2. TRIANTHEMA Linnaeus

Prostrate, glabrous or slightly hairy, succulent, branched, annual herbs. Leaves petioled, opposite, in unequal pairs, entire, ovate to obovate, their petioles dilated at the base and connected by their thin margins. Flowers axillary, small, solitary, sessile or pedicelled. Calyx-tube short or long, 5-lobed, often colored within. Stamens 5 or more, inserted near the top of the calyx-tube. Ovary free, 1- or 2-celled; styles 1 or 2; ovules 1 to many. Capsule thin or coriaceous, clavate to obovate, circumsciss. (Greek "three" and "flower," from the arrangement of the flowers in some species.)

Species about 10, tropical and subtropical, a single one in the Philippines.

1. **T. PORTULACASTRUM** L. (*T. monogyna* L.). Toston (Tag.); Ayam (Vis.).

Glabrous or nearly so, the branches up to 60 cm or more in length. Leaves obovate, 1 to 5 cm long. Flowers axillary, solitary, sessile, the calyx-lobes oblong, mucronate, 4 to 5 mm long, pink, imbricate. Stamens about 15. Style simple. Capsule 5 to 6 mm long, truncate; seeds about 10, small. (Fl. Filip. *pl. 165, T. obcordata.*)

In open waste places, cultivated lands etc., fl. Aug.–Mar.; in and about towns in the Philippines. All tropical countries.

3. MOLLUGO Linnaeus

Spreading or ascending branched herbs, the leaves entire, alternate, opposite, or whorled, fleshy. Flowers small, axillary, sessile or pedicelled, in clusters, cymes, or racemes. Sepals 5, persistent. Stamens 3 to 5, rarely many, the staminodes small or none. Ovary free, 3- to 5-celled; ovules many, axillary; styles 3 to 5. Capsule enclosed by the sepals, membranaceous, loculicidally 3- to 5-valved. (Old Latin name for some soft plant.)

Species about 12 in tropical and subtropical countries, 3 in the Philippines.

Densely pubescent............ 1. *M. lotoides*
Glabrous............ 2. *M. oppositifolia*

1. M. **LOTOIDES** (L.) O. Kuntze (*M. hirta* Thunb.) Lobio (Tag.)

A spreading or prostrate, much branched, annual herb, the branches 20 to 50 cm long, all parts densely stellate-pubescent with short gray hairs. Leaves broadly obovate, rounded, opposite or whorled, 1 to 3 cm long. Flowers fascicled, sessile or shortly pedicelled, greenish, about 5 mm long, the sepals densely pubescent outside. Stamens about 10, sometimes more, or less numerous. Capsule ovoid, somewhat shorter than the sepals. Seeds small, brown or black, very numerous, appendaged at the hilum.

In waste places, fl. Jan.–May; widely distributed in the Philippines. Tropics generally.

2. M. **OPPOSITIFOLIA** L. (*M. spergula* L.).

A slender, spreading or ascending, glabrous, branched, annual herb, the branches 10 to 40 cm in length. Leaves opposite or whorled, spatulate, oblanceolate, to oblong-obovate, 1 to 3 cm long. Flowers white, fascicled, the pedicels slender, up to 1 cm in length. Sepals 3 to 3.5 mm long. Stamens 5 to 10.

In open waste places, etc., fl. all the year; throughout the Philippines, but certainly introduced. Tropics generally.

47. PORTULACACEAE (PURSLANE OR GOLASIMAN FAMILY)

Diffuse, succulent, annual or perennial, prostrate or erect herbs. Leaves opposite or alternate, or the upper ones whorled, entire, terete or flat, the nodes with scale-like or hairy appendages, rarely naked. Flowers terminal often surrounded by a whorl of leaves, solitary or clustered. Sepals 2, connate below, the free parts deciduous. Petals 4 to 6. Stamens 5 or more, inserted with the petals. Ovary partly or quite inferior, 1-celled; style 3- to 8-fid; ovules numerous. Capsule crustaceous, circumsciss. Seed many, small, reniform.

Genera 18, species 200, in most warm and tropical countries, most abundant in tropical America, a single genus and 3 or 4 species in the Philippines.

1. PORTULACA Linnaeus

Characters of the Family as given above. (An old Latin name of uncertain meaning.)

Species about 30 in temperate and tropical regions, 3 or 4 in the Philippines, mostly introduced.

1. Leaves nearly terete; flowers pink or red.................................... 1. *P. pilosa*
1. Leaves flat; flowers yellow.
    2. Glabrous; nodal appendages none or very small; flowers 5-merous, capitate.. 2. *P. oleracea*
    2. Pilose; nodal appendages pilose; flowers 4-merous, solitary. 3. *P. quadrifida*

1. P. **PILOSA** L.

An erect or spreading, branched herb 10 to 30 cm high. Leaves alternate, linear, nearly terete, 1 to 2 cm long, pilose in the axils, those subtending the flowers in whorls of 6 to 9. Flowers few, sessile, surrounded at the base by numerous pilose appendages. Petals 5, red or pink. Stamens 20 to 25. Capsule ovoid.

In open dry places, San Juan del Monte, fl. July–Oct.; of local occurrence in the Philippines. A native of tropical America, introduced and naturalized here.

2. **P. oleracea** L. Golasiman (Tag.); Purslane.

An annual, prostrate or spreading, succulent, branched herb, quite glabrous, 10 to 50 cm long, the stems often purplish. Leaves fleshy, flat, obtuse, oblong-obovate, base cuneate, 1 to 2.5 cm long. Flowers in sessile, axillary and terminal, few-flowered heads, the heads solitary or cymose, the buds compressed. Petals 5, yellow, about as long as the sepals. Stamens 8 to 12. (Fl. Filip *pl. 164.*)

In open waste places, very common, fl. all the year; throughout the Philippines. All temperate and tropical countries.

3. P. QUADRIFIDA L.

A slender, prostrate, annual, succulent plant, the stems often rooting at the nodes, the nodal appendages pilose. Leaves ovate-elliptic, about 5 mm long, subsessile. Flowers small, terminal, solitary, surrounded by a 4-leaved involucre and copious white hairs. Petals 4, yellow.

Cementerio del Norte, Pasay, etc., in waste places, fl. all the year; of local occurrence in the Philippines and apparently introduced. Tropical Asia and Africa.

48. BASELLACEAE (BASELLA OR LIBATO FAMILY)

Twining, glabrous, herbaceous vines, more or less succulent. Leaves alternate, entire. Inflorescence axillary, spicate or racemose. Flowers small, perfect, 2-bracteolate. Sepals 2, more or less adnate to the corolla. Corolla-lobes 5, nearly free or more or less united. Stamens 5; anthers versatile. Ovary free, 1-celled, 1-ovuled. Fruit indehiscent, dry or fleshy surrounded by the perianth.

Genera 5, species about 14, mostly in tropical America, 2 genera and 2 species in the Philippines, both introduced.

Sepals not winged; filaments erect in bud.. 1. *Basella*
Sepals broadly winged down the back; filaments recurved in bud.
2. *Anredera*

1. BASELLA Linnaeus

A succulent, glabrous, twining vine. Leaves alternate, entire. Flowers in axillary spikes, white or red, small. Bracteoles minute, caducous. Sepals 2, connate, not keeled. Corolla 5-fid, somewhat fleshy, the lobes erect, obtuse. Stamens 5, inserted on the corolla-tube. Filaments straight in bud. Ovary globose; styles 3, connate at the base; stigmas linear-clavate. Fruit a globose utricle enclosed in and adnate to the perianth. (A Malabar name.)

A single variable species found in most tropical countries, its original home uncertain, possibly tropical Asia.

1. B. RUBRA L. Libato (Tag.).

A succulent, branched, glabrous, twining, herbaceous vine, reaching a length of several meters, the stems green or purplish. Leaves somewhat fleshy, ovate, petioled, acuminate, base cordate to decurrent, 5 to 12 cm long. Spikes axillary, solitary, 5 to 20 cm long. Flowers pink, about 4 mm long. Fruit ovoid or globose, 5 to 8 mm long. (Fl. Filip. *pl. 74.*)

Occasional in waste places, escaped from cultivation, fl. most of the year; throughout the Philippines but certainly introduced here. In most tropical countries, wild or cultivated, possibly a native of India.

2. ANDREDERA Jussieu

A scandent, glabrous, annual vine from fleshy tuberous roots. Leaves somewhat fleshy, entire. Racemes axillary. Flowers small, perfect, the bracteoles small. Sepals 2, boat-shaped, enclosing the corolla, broadly keeled down the back. Corolla deeply 5-parted, thin. Stamens 5, the filaments reflexed in bud. Ovary small, rounded; styles 3, somewhat connate at the base. Utricle ovoid or globose, included in the perianth.

A monotypic genus of tropical America, introduced in the Philippines.

1. A. **SCANDENS** (L.) Moq.

A glabrous, somewhat succulent, herbaceous, annual vine from large, fleshy, tuberous roots. Stems green or purplish, slender. Leaves shining, somewhat fleshy, ovate to oblong-ovate, obtuse to shortly acuminate, 5 to 10 cm long. Racemes axillary, solitary, erect, usually simple, 12 to 20 cm long. Flowers numerous, pale-greenish, 3 mm long, the sepals broadly winged down the back.

Common in thickets along roadsides, etc., fl. Aug.–Nov. A native of tropical America, now thoroughly naturalized in and about Manila, but not reported from any other part of the Orient.

49. NYMPHAEACEAE (WATERLILY OR LAUAS FAMILY)

Aquatic perennial herbs, often from stout rootstocks, the leaves usually floating, often peltate. Flowers solitary, often showy, on elongated scapes, floating on the surface of the water or raised above the surface. Sepals 3 to 5, free. Petals 3 to many, free, hypogynous or adnate to the fleshy disk. Stamens many. Carpels 3 or more, free or connate, or irregularly sunk in pits in the fleshy disk; ovules few or many. Fruit of free and indehiscent carpels, or the carpels more or less united, or sometimes of the enlarged fleshy disk bearing the nut-like carpels sunk in its crown. Seeds naked or arillate.

Genera 8, species about 50, in all temperate and tropical regions, 2 genera and 3 or 4 species in the Philippines.

1. CASTALIA Salisbury

Herbs of fresh water, the rootstocks large, creeping. Flowers on elongated scapes, usually floating, rarely borne above the surface of the water. Sepals 4. Petals white or colored, in several to many series, the inner ones gradually smaller and transformed into stamens. Filaments petal-like; anthers linear. Carpels many, in one series, sunk in the fleshy disk, crowned by the radiating stigmas; ovules many. Fruit a spongy berry ripening under water. (A fountain of Greek mythology.)

Species about 25 in all warm countries, 2 in the Philippines.

1. C. **STELLATA** (Willd.) Blume (*Nymphaea stellata* Willd.). Waterlily.

Leaves ovate to suborbicular, entire, rounded, slightly peltate, base deeply cordate, 15 to 25 cm long, often purplish beneath, glabrous. Flowers fragrant, white, about 8 cm in diameter. Sepals green, with few purple dashes, acuminate. Petals linear-oblong to lanceolate.

In stagnant pools of fresh water, Malate, rare, fl. Sept.–Nov.; in the Philippines known only from Manila, certainly introduced. Tropical Asia and Africa.

C. pubescens (Willd.) Blume (*Lauas*, Tag.), is of wide distribution in the Philippines, differing in many characters from the above, but especially in its leaves being pubescent beneath; it does not occur in our area. The lotus (*Nelumbium speciosum* Willd.) (*Baino*, Tag.) occurs in Laguna de Bay, and its flowers are occasionally sold in Manila.

50. CERATOPHYLLACEAE (CERATOPHYLLUM OR INATA FAMILY)

Submerged, slender, monoecious herbs growing in fresh water, the leaves whorled, cleft into slender, toothed lobes. Flowers minute, axillary, sessile, the perianth or involucre of 6 to 12, narrow, 2-fid segments. Male flowers with 20 to 30 stamens. Female flowers with a sessile, ovoid, 1-celled ovary; style subulate; ovule solitary. Fruit a small, coriaceous, ovoid or ellipsoid, compressed nut, terminated by the style.

A single genus with 3 species of wide distribution in fresh water in temperate and tropical regions of the world, a single species in the Philippines.

1. CERATOPHYLLUM Linnaeus

Characters of the Family. (From the Greek "horn" and "leaf.")

1. **C. demersum** L. Inata (Tag.).

Stems long, branched, slender, submerged, densely leafy. Leaves 1.5 to 2.5 cm long, whorled, the segments spreading when submerged, linear, toothed. Segments of the perianth subulate. Fruit variable, with two horns at the base.

Pasig River, not uncommon floating down from Lake Bay; widely distributed in the Philippines. Most temperate and tropical regions.

51. RANUNCULACEAE (CLEMATIS FAMILY)

Annual or perennial often suffrutescent herbs, sometimes climbing. Leaves opposite or alternate, simple or compound, entire, toothed, or lobed. Flowers regular in our genera, perfect or 1-sexual. Sepals 5 or more. Rarely fewer, valvate or imbricate, deciduous, sometimes petaloid. Petals none, or 3 to 5 or more, hypogynous, sometimes small. Stamens hypogynous, usually many. Carpels usually many, free, 1-celled, each with 1 or more ovules. Fruit of numerous 1-seeded achenes, often tailed or otherwise appendaged.

Genera 30, species about 1,100, in all parts of the world, 5 genera and 10 species in the Philippines, mostly at medium or higher altitudes.

1. NARAVELIA DeCandolle

Climbing, herbaceous or shrubby plants. Leaves opposite, 3-foliolate or 2-foliolate, the terminal leaflet usually transformed into a tendril. Flowers axillary, solitary or racemose, long-peduncled. Sepals 4 or 5. Petals 6 to 12, longer than the sepals. Achenes narrow, stipitate, beaked or crowned with the long bearded styles. (Named from the "ancient city of Gour" in Bengal.)

Species 3, India to Malaya, 2 in the Philippines.

1. **N. loheri** Merr. & Rolfe.

A slender, herbaceous, slightly pubescent vine, becoming nearly or quite glabrous. Leaves with 2, ovate to oblong-ovate, 5-nerved, somewhat acuminate, entire or sometimes coarsely 1- or 2-toothed leaflets 5 to 8 cm long, the tip minutely mucronate, base rounded, the tendril taking the place of the third leaflet slender, 3-partite at the apex. Flowers white or greenish-white, their pedicels up to 4 cm in length. Sepals 4, about 9 mm long. Petals about 12, linear-spatulate, 2 cm long or less, 1 to 2 mm wide. Achenes 10 to 15, about 2 cm long, hirsute, narrowed above into a slender beak, not tailed.

In thickets near the Pasay cemetery, fl. April–May; of very local occurrence in Luzon. Endemic.

52. MENISPERMACEAE (MOONSEED OR MACABUHAY FAMILY)

Twining or climbing, slender or stout, subherbaceous or woody vines. Leaves alternate, entire or lobed, usually palmately, rarely penninerved; stipules none. Flowers small, dioecious, solitary, fascicled, racemose or panicled. Sepals 6, rarely fewer or more numerous, imbricate in 2 to 4 series. Petals usually 6, rarely fewer or none, free or connate. Male flowers: Stamens hypogynous, usually one opposite each petal; anthers free or connate. Rudimentary ovary small or none. Female flowers: Staminodes 6 or 0. Ovaries 3, rarely 1 to 6 or more; style terminal, simple or divided; ovules solitary. Ripe carpels drupaceous. Seed usually hooked or reniform.

Genera 63, species about 360, in all tropical countries, few in some temperate regions, 15 genera and 26 species in the Philippines.

1. Leaves penninerved.. 1. *Pycnarrhena*
1. Leaves palmately 3- to 7-nerved.
    2. Sepals and petals 6; bracts very small or none.................. 2. *Tinospora*
    2. Sepals and petals 4; bracts on the female inflorescence prominent. 3. *Cissampelos*

1. PYCNARRHENA Miers

Climbing woody vines or suberect shrubs. Leaves oblong, coriaceous, entire, penninerved. Cymes axillary, short, usually fascicled. Male flowers: Sepals 6 to 9, the outer ones small, bract-like, the interior ones gradually larger, the innermost suborbicular, concave. Petals 2 to 6, smaller than the inner sepals. Stamens 2 to 10; filaments very short or none. Female flowers: Sepals and petals as in the males. Carpels 2 to 4, glabrous or pilose. Drupes 3, or fewer by abortion, subglobose; style-scar lateral. (Greek "dense" and "male" from the dense inflorescence.)

Species 17, south-eastern Asia through Malaya to Australia, 3 or 4 in the Philippines.

1. **P. manillensis** Vid. Ambal (Tag.).

A suberect or climbing shrub 1 m high or more. Leaves subcoriaceous, shining, elliptic-ovate, to oblong-elliptic, 13 to 30 cm long, acuminate, the nerves 5 to 7 pairs, very prominent on the lower surface. Male inflorescences axillary, short, pilose. The flowers crowded, yellowish, the sepals 7, the outer ones small, the 5 inner ones 1.5 to 2 mm in diameter. Petals about 3, obovate. Stamens 8 to 10. Drupes ellipsoid-globose, 10 to 15 mm long.

San Juan del Monte (Vidal), fl. June. Of local occurrence in the Philippines. Endemic.

2. TINOSPORA Miers

Climbing vines with very bitter sap and warty stems. Leaves deciduous, thin, entire, palmately 3- to 5-nerved. Racemes lateral, slender. Male flowers: Sepals 6. Petals 6, rarely 3, cuneate-ovate to subcordate. Stamens 6; filaments flattened. Female flowers: Sepals about as in the males. Petals minute, spatulate-oblong. Staminodes 6. Ovaries 3, free, erect; styles short. Drupes 3, or fewer by abortion, compressed, stipitate, globose or ellipsoid, the endocarp dorsally convex, ventrally flat or slightly concave. (From the old Latin name of *Viburnum tinus* and the Greek "seed.")

Species 24, tropical Asia and to Malaya and Australia, 1 in the Philippines.

1. **T. reticulata** Miers. Macabuhay (Tag.).

A very bitter, climbing, dioecious vine reaching a height of 4 to 10 m, the branches pendulous, all parts glabrous, the stems up to 1 cm thick, somewhat fleshy, with scattered protuberances. Leaves thin, ovate, acuminate, base truncate or somewhat cordate, glabrous, shining, 6 to 12 cm long, base 5-nerved; petioles 3.5 to 6 cm long. Racemes solitary or in pairs from the axils of fallen leaves, pale-green, slender, 10 to 20 cm long. Male flowers pale-green, short-pedicelled. Outer three sepals 1.5 mm long, the inner three 4 to 5 mm long. Drupes 7 to 8 mm long.

In dry thickets, common, Balintauac to Fort McKinley, fl. Mar.–May; widely distributed in the Philippines. Endemic.

3. CISSAMPELOS Linnaeus

Scandent, slender, suffrutescent or woody vines, the leaves ovate, sometimes peltate. Male flowers in axillary cymes, small. Sepals usually 4, erose. Petals 4, connate. Stamens 4, connate, surrounding the apex of the staminal-column. Female flowers racemed, fasciculate in the axils of leafy bracts. Sepals 2, or sepal 1 and petal 1, 2-nerved. Ovary 1; style short. Fruit globose, fleshy, 1-seeded. (Greek "ivy" and "grape vine.")

Species 21, in all tropical countries, a single variable one in the Philippines.

1. **C. pareira** L. Sinsao-sinsaoan (Tag.).

Scandent, slender, more or less pubescent or nearly glabrous, 3 to 4 m high, or of indefinite length. Leaves ovate to orbicular-ovate, often broader than long, 2 to 7 cm long, acute, usually apiculate, base broad, somewhat cordate or subtruncate, usually slightly peltate. Male panicles slender, 3 to 6 cm long, hairy, usually diffuse, the flowers very small, greenish. Female racemes 2 to 6 cm long, the bracts green, reniform, 1 to 1.5 cm long, broader than long. Fruit fleshy, globose, red, 5 to 7 mm in diameter, somewhat pubescent. (Fl. Filip. *pl. 432.*)

In thickets, flowering at intervals throughout the year; common and widely distributed in the Philippines. All tropical countries.

53. MAGNOLIACEAE (MAGNOLIA OR CHAMPACA FAMILY)

Trees or shrubs, sometimes scandent, with alternate, simple, entire or toothed leaves. Stipules large, small, or wanting. Flowers yellow or white, fragrant, axillary and terminal, solitary, perfect. Sepals and petals similar, deciduous, thin, arranged in whorls of threes. Stamens numerous, many-seriate, hypogynous; anthers adnate, introrse. Carpels many, free or partly cohering in one whorl or on an elongated axis;

ovules 2 or more. Fruit of several to many follicles, or berry-like, arranged in a whorl or on an elongated cone. Seeds solitary or few, sometimes pendulous from a long funicle.

Genera 9, species about 80, chiefly natives of the mountains of tropical and temperate Asia and of the eastern United States, a few in Malaya and Australia, 5 genera and about 15 species in the Philippines.

1. MICHELIA Linnaeus

Tress with alternate, simple, entire leaves, the stipules large, sheathing the buds, deciduous. Flowers axillary, solitary, yellow or white, very fragrant. Sepals and petals similar, 9 to 15 or more, 3- or more-seriate, deciduous. Stamens numerous, many-seriate; filaments flat; anthers adnate. Carpels many, on an elongated axis; stigma decurrent; ovules 2 or more. Fruit a lax or dense elongated spike of coriaceous, dorsally dehiscing carpels. Seeds pendulous from the carpels by a long cord. (In honor of P. A. Micheli, an early Italian botanist.)

Species about 15, India to China and Malaya, 2 introduced and one or two indigenous species in the Philippines.

Flowers deep-yellow.. 1. *M. champaca*
Flowers white.. 2. *M. longifolia*

*1. M. **CHAMPACA** L. Sampaca or champaca (Sp.-Fil.).

A small tree, the young branchlets appressed-pubescent. Leaves ovate-lanceolate to oblong-lanceolate, gradually narrowed upward to the long-acuminate apex, 12 to 20 cm long 2.5 to 6 cm wide. Flowers yellowish-brown, very fragrant, 4 to 5 cm long; perianth segments usually 15 to 20. Ovaries pubescent. (Fl. Filip. *pl. 191.*)

Introduced from India or Malaya and only cultivated in the Philippines, not spontaneous; occasional in Manila, fl. June–Dec., and probably in other months.

*2. M. **LONGIFLORA** Blume. Champacang-puti (Tag.).

A small tree with elliptic-ovate to elliptic-oblong leaves, up to 20 cm long and 9 cm wide. Flowers white.

Introduced and occasionally cultivated in Manila, fl. Sept., and other months; a native of Java.

The fruits of *Illicium anisatum* L., the star-anise, locally known as *sanki*, are imported from China in considerable quantities and are sold in the local markets. The species however, does not grow in the Philippines.

54. ANONACEAE (CUSTARD APPLE OR LANUTAN FAMILY)

Trees or shrubs, sometimes scandent. Leaves alternate, exstipulate, simple, entire. Flowers perfect. Sepals 3, free or connate, usually valvate. Petals 6, hypogynous, 2-seriate, or the inner absent. Stamens many, hypogynous, closely packed on the torus; filaments short or none; anthers adnate, the connective produced into an oblong or truncate head. Ovaries one or more, free or united; stigmas distinct; style none or very short; ovules 1 or more. Fruit of 1 or more, sessile or stalked, 1- to many-seeded, fleshy, indehiscent carpels, rarely dry and dehiscent.

Genera about 45, species 500, chiefly in the tropics of the Old World, about 20 genera and 80 species known from the Philippines.

1. Scandent shrubs.
  2. Petals spreading, broad, flat, not covering the anthers........ 1. *Uvaria*
  2. Petals inflated at the base, conniving and covering the anthers. 2. *Artabotrys*
1. Erect shrubs or trees.
  2. Inner petals very different from the outer ones; ovules solitary in each carpel; fruit large, fleshy, of many connate carpels, edible. 3. *Anona*
  2. Inner petals similar to the outer ones, or wanting.
    3. Ovules many, 2-seriate; petals long, lanceolate............ 4. *Canangium*
    3. Ovules 2 to 6, 1-seriate on the ventral suture........................ 5. *Unona*
    3. Ovules 2, basal.. 6. *Polyalthia*

1. UVARIA Linnaeus

Scandent shrubs usually more or less stellate-pubescent. Flowers terminal, leaf-opposed, or extra-axillary, cymosely fascicled or solitary. Sepals 3, densely pubescent. Petals 6, orbicular, imbricate in 2 rows, spreading. Stamens indefinite; top of the connectives truncate. Ovaries many, linear-oblong; ovules many, 2-seriate, rarely few or 1-seriate. Ripe carpels fleshy, usually many-seeded. (Latin "grape," from the resemblance of the fruit of some species.)

A large genus, chiefly of tropical Asia and Malaya, about 12 known to occur in the Philippines, a single one in our area.

1. **U. rufa** Blume. Susong-calabao (Tag.).

A scandent shrub often 5 to 6 m in length, the younger parts and lower surfaces of the leaves rather densely and softly pubescent with stellately arranged, rusty, short hairs. Leaves oblong-ovate to oblong-lanceolate, 8 to 16 cm long, apex acuminate, base rounded or cordate, the petioles very short. Flowers extra-axillary, solitary or 2 or 3 in depauperate cymes, usually about 1.5 to 2 cm in diameter. Fruits fleshy, red when mature. (Fl. Filip. *pl. 195, U. purpurea.*)

In thickets, La Loma to Guadalupe, fl. May–July; rather widely distributed in the Philippines at low altitudes; Malay Archipelago.

2. ARTABOTRYS R. Brown

Scandent shrubs with shining leaves. Flowers mostly solitary, usually on woody, mostly hooked, recurved peduncles. Sepals 3, valvate. Petals 6 in 2 series, their bases concave, connivent, the limbs spreading, flat or terete. Stamens many, oblong or cuneate, the connectives truncate or produced. Torus flat or convex. Ovaries few or many; style oblong; ovules 2, erect. Ripe carpels fleshy. (Greek "joint" and "panicle," in allusion to the peculiar inflorescence.)

Species about 25, tropical Africa, Asia, and Malaya, about 4 in the Philippines, a single introduced one in our area.

* 1. **A. UNCINATUS** (Lam.) Merr. (*A. odoratissimus* R. Br.). Ilang-ilang de China (Sp.-Fil.).

A scandent woody shrub, glabrous or nearly so, 3 to 4 m in length. Leaves oblong-elliptic to oblong-lanceolate, acuminate, base acute, 9 to 16 cm long. Flowers yellow, fragrant, solitary or in pairs. Sepals green, short, ovate, connate below. Petals elliptic-oblong to ovate-lanceolate above the inflated saccate base, acute, slightly pubescent, about 2.5 cm long, yellow. Ripe fruit 4 to 10 or more on each peduncle, narrowly obovoid, yellow, glabrous, 2.5 to 4 cm long. (Fl. Filip. *pl. 194, A. odoratissimus.*)

Rarely cultivated, flowering most of the year. A native of India and Ceylon, cultivated in other tropical countries.

3. ANONA Linnaeus

Small trees or shrubs. Flowers solitary or fascicled, terminal or leaf-opposed. Sepals 3, small, valvate. Petals 3 or 6, valvate in 2 series or the inner series wanting, the outer ones 3-angled or broad and flat, concave at the base, the inner ones quite different from the outer. Stamens numerous; anther-cells narrow, dorsal, contiguous, top of the connective ovoid. Ovaries many, subconnate; style oblong; ovule 1, erect. Ripe carpels confluent into a many-celled, ovoid or globose, many-seeded, fleshy fruit. (Said to be derived from the Malay name *menona.*)

Species many in Africa and America, several other species introduced from the latter region into other tropical countries for the sake of their edible fruits; 3 species in the Philippines, all introduced from Mexico at an early date.

1. Outer 3 petals broadly ovate-cordate, about 3 cm wide, the inner 3 also large; fruit prominently echinate.. 1. *A. muricata*
1. Outer 3 petals narrowly oblong, less than 1 cm wide, inner 3 minute or wanting.
    2. Flowers 2 or 3 together on lateral peduncles; leaves long-acuminate; fruits smooth, reticulate.. 2. *A. reticulata*
    2. Flowers solitary; leaves obtuse or acute; fruit roughened by the rounded ends of the carpels.. 3. *A. squamosa*

* 1. A. **MURICATA** L. Guanabanos (Sp.-Fil.); Soursop.

A tree 5 to 7 m high. Leaves oblong-obovate to oblong, 7 to 20 cm long, smooth and shining, apex shortly and abrubtly acuminate, base usually acute; petioles about 5 mm long. Flowers large, yellowish or greenish-yellow, solitary. Outer 3 petals broadly cordate-ovate, acuminate, very thickly coriaceous, up to 5 cm long and 3 cm wide, the inner 3 also large, elliptic to obovate, rounded, coriaceous. Fruit ovoid, up to 18 cm long, fleshy, edible, covered with scattered, soft, spine-like processes. (Fl. Filip. *pl. 196.*)

Occasionally cultivated, fl. most of the year; a native of tropical America, introduced at an early date and now widely cultivated in the Archipelago.

* 2. A. **RETICULATA** L. Anonas (Sp.-Fil.); Custard Apple.

A tree 10 m high or less. Leaves oblong to oblong-lanceolate, acuminate, 20 cm long or less, glabrous; petioles 1 to 1.5 cm long. Flowers greenish-yellow, fragrant, 2 to 2.5 cm long, 2 or 3 together on lateral peduncles. Outer petals as in the next species, the inner one very small, narrowly oblong or wanting. Fruit subglobose or ovoid, large, fleshy, edible, with pentagonal areolae on the outside. (Fl. Filip. *pl. 197.*)

Cultivated, fl. at intervals throughout the year. Extensively cultivated in the Philippines, a native of tropical América; introduced into the Philippines at an early date, now widely distributed in the tropics of the world.

* 3. A. SQUAMOSA L. Ates (Sp.-Fil.); Sugar Apple.

A small tree 3 to 5 m high. Leaves somewhat pubescent when young, oblong, obtuse, acute, or obscurely acuminate, 8 to 15 cm long; petioles 1 to 1.5 cm long. Flowers axillary, solitary, about 2.5 cm long; pendulous, pubescent, 3-angled, greenish-white or yellowish. Fruit somewhat heart-shaped or ovoid, large, fleshy, pale or glaucous when mature, edible, 6 to 9 cm long, the outside roughened by the ends of the carpels. (Fl. Filip. *pl. 192.*)

Commonly cultivated, fl. most of the year; widely distributed in the Philippines and subspontaneous. A native of tropical America, introduced in the Philippines at an early date by the Spaniards; now found in most tropical countries.

4. **CANANGIUM** Baillon

Trees with rather large leaves, somewhat drooping branches and large axillary, fascicled flowers. Sepals 3, ovate, valvate. Petals 6, 2-seriate, subequal, long, flat. Stamens linear, anther-cells approximate, extrorse; connective produced into a lanceolate, acute process. Ovaries many; ovules numerous, 2-seriate. Fruit fleshy, cylindric-oblong, stalked; seeds many, the testa crustaceous, pitted. (From the Malay name of one species.)

Two or three species confined to Malaya, a single one in the Philippines.

1. **C. odoratum** (Lam.) Baill. (*Cananga odorata* Hk. f. & Th.). Ilang-ilang (Tag.).

A medium-sized to rather large tree, the branches somewhat drooping. Leaves oblong-ovate, apex acuminate, base usually rounded 12 to 20 cm long, usually slightly pubescent beneath. Flowers very fragrant, greenish, soon turning yellowish, pendulous, their pedicels 1 to 2.5 cm long, elongated in fruit. Sepals ovate, pubescent. Petals somewhat pubescent, lanceolate, 4 to 6 cm long, 0.5 to 1 cm wide. Fruit fleshy, oblong-cylindric, green or olivaceous, 2 cm long. (Fl. Filip. *pl. 221, Cananga odorata.*)

Very commonly cultivated in Manila, fl. all the year, the flowers being distilled in large quantities for the valuable perfume-oil known as ilang-ilang; throughout the Philippines, cultivated and indigenous, ascending to at least 700 m in forests. Ava, Tenasserim, and Java; planted in many other tropical countries.

5. **UNONA** Linnaeus

Erect or scandent shrubs or trees. Flowers usually solitary, axillary, extra-axillary, or leaf-opposed. Sepals 3. Petals 6, 2-seriate. Stamens cuneate; anther cells linear, extrorse, top of the connective subglobose or truncate. Ovaries numerous; style ovoid or oblong, recurved, grooved; ovules usually 5 or 6, 1-seriate. Ripe carpels many, elongated and constricted between the seeds. (Altered from *Anona,* another genus of the family.)

Species about 50, tropical Asia and Africa, about 7 known from the Philippines; one introduced in our area.

* 1. U. CHINENSIS (Lour.) DC. (*U. discolor* Vahl).

An erect shrub or a small tree. Leaves 8 to 15 cm long, oblong to oblong-ovate, apex acuminate, base rounded, nearly glabrous, the lower surface, when dry, somewhat glaucous. Peduncles extra-axillary, about

5 cm long, 1-flowered, with a lanceolate, 2 cm long bract below the middle. Sepals ovate-lanceolate, acuminate, about 1.3 cm long. Petals somewhat pubescent, yellow, fragrant, 4 to 5 cm long. Carpels numerous, moniliform, 2 to 5 cm long, stalked, each joint with a single seed.

I have seen a single specimen of this collected in Manila, but have never seen the living plant; introduced here, although apparently indigenous in Palawan. India to Malaya.

6. POLYALTHA Blume

Erect shrubs or trees. Flowers leaf-opposed, solitary. Sepals 3. Petals 6, 2-seriate, ovate or elongated, flat. Stamens cuneate; anther-cells extrorse, remote. Ovaries many; ovules 1 or 2, basal and erect or subbasal and ascending. (Greek "many" and "to heal," from supposed medicinal properties of some species.)

Species about 50, mostly tropical Asia and Malaya, a few in Africa and Australia, about 15 in the Philippines.

1. **P. suberosa** (Roxb.) Benth. & Hook. f. Tagputagpuan, Duhatduhatan (Tag.).

A shrub or small tree 2 to 4 m high, the branchlets slightly pubescent. Leaves oblong to narrowly obovate-oblong, subacute, blunt or somewhat rounded at the apex, 5 to 11 cm long, slightly pubescent beneath, the petioles very short. Flowers pale-yellow, solitary, 1 cm long or less, their pedicels leaf-opposed, slender, 1 to 2 cm long, the sepals and petals slightly pubescent. Fruits numerous, ovoid or globose, purple, fleshy, edible, 4 to 5 mm long. (Fl. Filip. *pl. 193, Phaeanthus malabaricus.*)

Occasional in thickets etc., fl. all the year; widely distributed in the Philippines at low altitudes. India.

55. LAURACEAE (LAUREL OR BATICULING FAMILY)

Trees or shrubs with opposite, alternate, or somewhat whorled, exstipulate leaves, or (*Cassytha*) leafless, parasitic, herbaceous, vines. Flowers small, regular, perfect, or uninsexual and monoecious or dioecious, axillary, usually paniculate, sometimes spicate. Perianth with a short tube, the segments 3 to 8, usually 6, often deciduous. Stamens 6 to 30, usually 9, in 3 or more rows, inserted on the perianth-tube; filaments flattened, sometimes with glands near the base; anthers 2- or 4-celled, opening by up-curving lids. Ovary superior, 1-celled, with a solitary ovule pendulous from the top. Fruit dry or fleshy, often surrounded at the base by the persistent perianth-tube. Seed solitary, pendulous, embryo large, cotyledons plano-convex, endosperm none.

Genera 47, species more than 1,000, warmer parts of both hemispheres, chiefly tropical, about 12 genera and 75 species in the Philippines.

1. Shrubs or trees.
    2. Perianth persistent in fruit; fruits small.
        3. Leaves and bark very aromatic; leaves mostly 3- or 5-nerved; flowers not involucrate .... 1. *Cinnamomum*
        3. Leaves and bark not or but slightly aromatic; leaves penninerved; flowers involucrate .... 2. *Litsea*
    2. Perianth deciduous; fruit large, fleshy edible .... 3. *Persea*
1. Twining, leafless, yellow-brown, parasitic, slender vines .... 4. *Cassytha*

1. CINNAMOMUM Blume

Trees with opposite, coriaceous, 3-nerved leaves, and very aromatic bark and twigs. Flowers small, often unisexual, in axillary or subterminal panicles or racemes. Perianth-tube short, cup-shaped or campanulate, the segments 6, either deciduous or persistent and enlarging in fruit. Stamens 9, in 3 rows; anthers 4-celled, of the first two rows introrse, of the third row extrorse, a fourth row represented by 3 sagittate staminodes. Fruit small, ovoid, surrounded at the base by the enlarged, persistent perianth. (From the Arabic name of cinnamon.)

Species about 50, 4 to 5 in the Philippines, a single introduced one in our area.

* 1. C. ZEYLANICUM (L.) Bl. Canela (Sp.); Cinnamon.

A small tree, glabrous except the finely silky-pubescent buds. Leaves coriaceous, shining, 8 to 15 cm long, oval or oval-lanceolate, base acute, apex acuminate, strongly 3- or 5-nerved. Panicles usually about as long as the leaves, mostly clustered in the upper axils. Flowers numerous, pale-yellow, small, pubescent outside with grayish hairs. Fruit about 1 cm long, oblong-ovoid, dry or slightly fleshy, surrounded by the enlarged perianth, the perianth-segments persistent.

Occasionally cultivated in Manila, fl. May–Aug., and probably in other months; introduced from India or Ceylon.

In addition to the above the camphor tree [*C. camphora* (L.) Nees], a native of China and Formosa, is represented in our area by young specimens cultivated in Singalon.

2. LITSEA Lamarck

Trees with penninerved, alternate leaves and rather small, dioecious flowers crowded in small glomerules or umbels, each umbel subtended by 4 concave imbricate bracts which look like sepals, forming an involucre, the glomerules or umbels umbellately or racemosely arranged, axillary. Perianth-tube long or short. Stamens in several rows, the innermost ones more or less imperfect; anthers all introrse, 4-celled. Fruit globose or ovoid, often fleshy, seated on the cup-shaped, enlarged perianth-tube. (From the Chinese name of one species.)

Species more than 100, in the Indo-Malayan region, 25 or more in the Philippines, two in our area.

Heads or umbels of flowers solitary or umbellate; leaves very densely and softly pubescent.. 1. *L. glutinosa*
Heads or umbels racemosely disposed; leaves glabrous or only slightly pubescent.. 2. *L. perrottetii*

1. **Litsea glutinosa** (Lour.) C. B. Rob. Puso-puso (Tag.).

A tree 10 m high or less, the young parts usually more or less softly pubescent. Leaves elliptic to oblong-elliptic, usually softly pubescent, 9 to 20 cm long. Umbels in the upper axils, solitary or umbellate, 1 to 1.5 cm in diameter, their peduncles about 1 cm long, containing many, small crowded, yellowish flowers. Fruit globbose, 8 mm in diameter or less. (Fl. Filip. *pl. 360, Sebifera glutinosa.*)

Occasional, Malate, Pasay, Masambong etc., fl. Mar.–May; widely distributed in the Philippines at low altitudes and in the Indo-Malayan region generally.

2. **L. perrottetii** (Blume) F.-Vill. Bacan (Vis., Tag.); Maguilic, Baticuling (Tag.); Cubilan (Il.).

A tree 5 to 15 m high, glabrous, or the branchlets, inflorescence, and lower surfaces of the leaves slightly pubescent. Leaves subcoriaceous, ovate to oblong-ovate, brown and shining when dry, 8 to 14 cm long, base usually rounded or somewhat cordate, apex acuminate, the nerves and reticulations prominent on the lower surface. Inflorescence axillary, the flowers small, greenish-white, or yellowish, in dense, subcapitate, bracteate umbels which are arranged in 2 to 8 cm long, usually pubescent racemes, the individual umbels in flower 6 to 10 mm in diameter. Fruit subellipsoid, 8 to 10 mm long.

In thickets, Pasig, fl. Jan.–Feb.; widely distributed in the Philippines. Endemic.

3. PERSEA Gaertner

Small or medium trees with alternate, penninerved leaves. Flowers small, perfect, yellowish-green, cymose or panicled, the inflorescence axillary. Perianth-segments 6, those of the outer series shorter than the others. Stamens 12, in 4 series, those of the inner one or two series reduced to staminodes; anthers erect, 4-celled, those of the third row extrorse, introrse in the outer row. Fruit a large fleshy drupe. (A name applied by Theophrastus to an Egyptian tree.)

Species 10 or more, of wide tropical distribution, several in the Philippines, a single introduced one in our area.

* 1. **P. AMERICANA** Mill. (*P. gratissima* Gaertn.). Alligator Pear, Avocado.

A tree 10 m high or less. Leaves oblong to oval or obovate, about 20 cm long. Flowers in naked, panicled, pubescent cymes. Flowers small, the perianth-segments 4 to 5 mm long. Fruit large, fleshy, elongated, often somewhat pear-shaped, 8 to 18 cm long, the flesh soft, edible, the single seed large.

Singalon, cultivated, fl. March. A native of tropical America and a highly prized fruit worthy of extended culture in the Philippines. The only specimens at present known are those introduced from Honolulu in 1903; it was, however, introduced by the Spaniards before 1700 and a few trees persisted until recent times, but apparently it was never widely distributed in the Archipelago.

4. CASSYTHA Linnaeus

Leafless, parasitic, twining, brown vines, the branches filiform, provided with suckers. Flowers minute, usually perfect, bracteate, in short spikes. Perianth-tube short, enlarged and fleshy in fruit, the segments 6, in 2 rows. Stamens 9, in 3 rows; anthers all 2-celled, the 2 outer rows introrse, the inner row extrorse. Fruit inclosed in but free from the enlarged, succulent, perianth-tube. (Greek name for dodder (*Cuscuta*), a plant having a similar appearance.)

Species about 15 in the tropics of both hemispheres, 1 in the Philippines.

1. **C. filiformis** L.

Stems very long, slender, brown, yellowish-brown, or greenish, twining and matted together, branched, glabrous or pubescent. Flowers small, sessile, in short spikes. Fruit globose about 7 mm in diameter, fleshy.

In thickets along the beach, Parañaque, Malabon, etc., fl. all the year; widely distributed in the littoral districts of the Philippines and in the tropics generally. It has quite the aspect and habit of dodder (*Cuscuta*).

56. HERNANDIACEAE (HERNANDIA FAMILY)

Trees, shrubs, or woody vines, with alternate, entire, simple or 3-foliolate, exstipulate leaves. Inflorescence cymose or paniculate, axillary or terminal. Flowers regular, perfect, or through abortion monoecious, the perianth-segments 3 to 10, valvate, in two series, or the corolla wanting. Stamens few, inserted in a single row, the filaments with glands or staminodes at their base; anthers introrse, 2-celled, opening by recurved valves. Ovary inferior, 1-celled, with a single pendulous ovule. Fruit various, indehiscent, sometimes winged.

Genera 4, species 27, in all tropical countries, 3 genera and 4 species in the Philippines.

1. ILLIGERA Blume

Climbing shrubs with alternate, 3-foliolate leaves, the leaflets entire. Inflorescence axillary, elongated, lax, cymose. Flowers 5-merous, bracteolate, the calyx tube shortly constricted above the ovary, the limb 5-lobed. Petals 5, valvate, oblong, alternate with the calyx-lobes and about as long. Stamens 5, epigynous, the filaments with a pair of staminodes on each side near the base. Ovary 1-celled, inferior, 1-ovuled; style simple, filiform; stigma dilated. Fruit indehiscent, with 2 broad lateral wings, and frequently with two additional keels or narrow wings. (In honor of J. K. W. Illiger, a German naturalist.)

Species 13, 1 in Africa, the remaining 12 India to southern China and Formosa southward to the Malay Peninsula and Archipelago, 2 in the Philippines.

1. **I. luzonensis** (Presl) Merr. (*I. meyeniana* Kth.).

A vine reaching a height of 4 to 5 m, nearly glabrous except the somewhat pubescent younger parts and inflorescence. Leaflets broadly ovate, somewhat acuminate, base rounded or slightly cordate, 5 to 10 cm long. Cymes axillary, lax, up to 20 cm in length. Flowers pinkish to purplish-red, 8 to 10 mm long. Fruits somewhat 4-angled, including the lateral wings 2 to 3 cm long, 4 to 5 cm wide, the wings rather thin, rounded, the two additional keels or narrow wings between the broad ones 5 mm wide or less.

In thickets, Masambong to Diliman, fl. Sept.–Oct.; widely distributed in the Philippines. Formosa.

57. PAPAVERACEAE (POPPY FAMILY)

Annual herbs with yellow juice. Leaves alternate, sessile, sinuate-lobed, spiny. Flowers large, yellow, perfect, regular. Sepals 2 or 3. Petals 4 to 6. Stamens indefinite. Ovary 1-celled; style short; stigma 4- to 7-lobed; ovules very many on 4 to 7 parietal placentas. Capsule dehiscing at the top by short valves; seeds many.

Genera 30, species about 300. Represented in the Philippines by a single introduced genus and species.

1. ARGEMONE Linnaeus

Characters of the Family as given above. (From a Greek name signifying a desease of the eye, for which the juice of a plant so called was considered to be a remedy.)

Species 6 in tropical America, 1 now found in many other countries.

1. A. MEXICANA L.

An erect, rather stout, branched, annual herb 1 m high or less, with yellowish sap. Leaves 5 to 15 cm long, more or less variegated with green and white, glaucous, the base broad, half-clasping the stem, prominently sinuate-lobed, spiny. Flowers terminal, yellow, 4 to 5 cm in diameter. Capsule spiny, about 3 cm long. (Fl. Filip. *pl. 187.*)

Waste places, roadsides etc., fl. most of the year. A native of tropical America, introduced into the Philippines at an early date and now widely distributed; tropics of the world.

58. CRUCIFERAE (MUSTARD OR MOSTAZA FAMILY)

Herbs with watery, often pungent juice. Basal leaves in a rosette, those on the stem alternate, variously toothed or lobed, or entire. Flowers racemose. Sepals 4, free, the two lateral ones often large and saccate at the base. Petals 4, free, imbricate. Stamens usually 6, the two outer opposite the lateral sepals, the 4 inner longer, in opposite pairs. Disk usually with 4 glands opposite the sepals. Ovary 2- or 1-celled; styles short or none; ovules usually many and 2-seriate. Fruit usually a 2-celled, 2-valved pod, the valves diciduous and leaving the seeds on the placentas, or indehiscent, or jointed. Seeds small.

Genera 218, species about 2,000, mostly in the temperate regions of the Old World, 4 genera and about 6 species in the Philippines, mostly introduced.

1. Pods dehiscent.
  2. Seed 2-seriate; cotyledons plane, accumbent.................... 1. *Nasturtium*
  2. Seeds 1-seriate; cotyledons conduplicate.................................. 2. *Brassica*
1. Pods indehiscent.. 3. *Raphanus*

1. NASTURTIUM R. Brown

Erect, simple or branched, glabrous or hairy herbs. Leaves entire, lobed or pinnatifid. Flowers small, yellow, racemose. Sepals short, spreading, equal at the base. Petals short, narrowed below, or wanting. Stamens 2, 4, or 6. Pod slender, cylindric, short or long. Seeds small, 1-seriate, the cotyledons accumbent. (Latin name of a strongly scented cress, from "nose" and "to twist.")

Species about 20 in temperate and tropical countries, 1 in the Philippines.

1. N. INDICUM DC.

An erect, usually branched nearly glabrous herb 20 to 40 cm high. Leaves oblong, variously lobed and toothed, 5 to 10 cm long, often lyrate, petioled, the upper ones sessile or nearly so. Racemes long, many-flowered, flowering at the tip. Flowers small, yellow, 2.5 to 3 mm long, the sepals as long as the petals. Pods spreading, slender, cylindric, 1 to 2 cm long.

Damp ditches along roadsides, etc., fl. all the year, widely distributed in the Philippines, and undoubtedly introduced. India to Japan, southward to Malaya.

2. BRASSICA Linnaeus

Erect, simple or branched, glabrous or hairy herbs. Leaves large, lyrate or pinnatifid, sometimes entire. Racemes long, many-flowered. Flowers small, yellow. Sepals erect or spreading, the lateral ones usually saccate at the base. Pods slender, dehiscent, cylindric or angular, often with an indehiscent beak. Seeds 1-seriate; cotyledons usually conduplicate. (Latin name of the cabbage.)

Species about 80 in the temperate parts of the Old World, a few introduced in the Philippines.

1. B. JUNCEA (L.) Coss. Mostaza (Sp.-Fil.).

An erect, branched, glabrous annual 0.4 to 1 m high. Leaves 5 to 15 cm long, or in some cultivated forms much larger, thin, oblong-obovate to oblong-lanceolate, irregularly toothed or subentire, or the lower ones lobed or pinnatifid. Flowers yellow, 6 to 8 mm long. Pods ascending, linear-lanceolate, 1.5 to 3 cm long, somewhat contracted between the seeds, the beak seedless.

Commonly cultivated, also occasional in waste places, fl. all the year; certainly an introduced plant in the Philippines. Europe to India and China, introduced in other regions.

The form commonly cultivated by Chinese gardeners, known as "pechai," seems to be a form of *B. juncea* (L.) Coss. Cabbage (Sp., *repollo=Brassica oleracea* L.) is also commonly cultivated in and about Manila and in many of the provinces; it is a native of Europe.

3. RAPHANUS Linnaeus

Coarse, erect, glabrous or hairy herbs, usually with fleshy tap roots. Leaves lyrately or pinnately lobed. Flowers large, white to pale-purplish, in elongated racemes. Sepals erect, the lateral ones saccate at the base. Pod indehiscent, elongated, constricted between the seeds, and with a long beak. (The ancient Greek name.)

Species about 6, in Europe and Asia, 1 introduced and cultivated in the Philippines.

*1. R. SATIVUS L. Rabano (Sp.); Radish.

A coarse, erect, branched plant 0.5 to 1.5 m high, from a fleshy tap root, the leaves up to 20 cm long, lyrately lobed, rough and somewhat hairy or nearly glabrous. Flowers white to pale-purple, about 1.5 cm long. Pods lanceolate, long-beaked, acuminate, few seeded, 2 to 6 cm long.

Commonly cultivated, occasionally flowering. A native of Europe or Asia, introduced here and very generally cultivated.

59. CAPPARIDACEAE (CAPER OR DAUAG FAMILY)

Herbs, shrubs, or trees, erect or climbing. Leaves simple or palmately compound, alternate, the stipules 2 or none, sometimes represented by sharp spines. Flowers regular or irregular, perfect, solitary, racemed, umbelled or corymbose, terminal or axillary. Sepals 4, free or connate. Petals 4, hypogynous or inserted on the disk. Stamens 4 to many, sometimes inserted on a long or short gynophore. Ovary stalked or sessile, 1-celled; style short or none; ovules many, on 2 to 4 parietal placentae. Fruit a capsule or berry-like.

Genera 40, species over 400, in the warmer part of both hemispheres, 5 genera and 20 species in the Philippines.

1. Erect or climbing spiny shrubs with simple leaves .... 1. *Capparis*
1. Herbs with digitately compound leaves.
    2. Stamens inserted on the disk; petals imbricate in bud .... 2. *Cleome*
    2. Stamens inserted on the gynophore; petals spreading in bud. 3. *Gynandropsis*

1. CAPPARIS Linnaeus

Erect or climbing shrubs or small trees, armed with short, sharp, reflexed, stipular spines. Leaves simple, entire. Inflorescence various, the flowers axillary, solitary, fascicled, umbellate, or arranged in vertical lines along the branches, or racemose, or paniculate. Sepals 4, in 2 series. Petals 4, imbricate, white or colored. Stamens many, inserted at the base of the long, slender gynophore. Ovary long-stalked. Fruit globose to ovoid, fleshy, indeshiscent. Seeds many, imbedded in the pulp of the fruit. (The Latin name for the caper.)

Species 120 or more in most warm and tropical countries, about 15 in the Philippines.

1. Flowers in axillary umbels; leaves small; spiny vines........ 1. *C. sepiaria*
1. Flowers in vertical lines along the branches.
    2. Glabrous; erect or suberect... 2. *C. micracantha*
    2. Younger parts brown-tomentose; climbing........................ 3. *C. horrida*
1. Flowers large, solitary, long-pedicelled; an erect, unarmed shrub. 4. *C. cordifolia*

1. **C. sepiaria** L.

A woody vine 1.5 to 3 m high, the young branches pubescent, spines short, sharp, recurved. Leaves oblong-ovate to elliptic-ovate, 2 to 8 cm long, retuse. Flowers in 5- to 15-flowered, axillary and terminal, sessile or short-peduncled umbels, the pedicels slender, 1 to 1.5 cm long. Sepals green, concave. Petals oblong, white, ciliate, 7 to 8 mm long. Fruit globose, 8 to 10 mm in diameter, nearly black when mature, 1-seeded. (Fl. Filip. *pl. 209.*)

In dry thickets Pasay to Pasig, etc., fl. Mar.–May; widely distributed in the Philippines. India to southern China and the Philippines.

2. **C. micracantha** DC. Halobagat (Tag.).

A glabrous suberect shrub with drooping branches, or scandent, 2 to 4 m high, the stipular thorns short, sharp, nearly straight. Leaves oblong or oblong-elliptic, 8 to 17 cm long, leathery, shining, obtuse, apiculate, base rounded. Flowers in vertical lines along the branches above the leaf-axils, shortly pedicelled, 2 to 6 in a series, the uppermost one of each series opening first. Sepals pale-green. Petals oblong or elliptic, about 1 cm long, white, or the lower ones yellowish or reddish. Stamens white, much exceeding the petals. Fruits ovoid or globose, about 5 cm in diameter. (Fl. Filip. *pl. 180, C. callosa.*)

In thickets, occasional, fl. Nov.–Feb.; common and widely distributted in the Philippines. India to Malaya.

3. **C. horrida** L. Dauag (Tag.).

A climbing spiny shrub reaching a height of 3 m or more, the young leaves and branches pubescent. Spines short, sharp, recurved, in pairs subtending each leaf or branch. Leaves oblong to oblong-ovate, acuminate, 9 to 15 cm long, soon becoming leathery and glabrous or nearly so. Flowers, seriately arranged in vertical lines above the axils, usually 3 to each axil, the pedicels 1 to 2 cm long. Sepals green, concave, about 1 cm long. Petals pink, soon turning purplish, pubescent inside, 1.5 to 1.8 cm long narrowly obovate-oblong to oblong. Stamens pink, soon turning dark-purple, about 3.5 cm long. Fruit subglobose to ellipsoid, 2 to 3 cm in diameter, fleshy. (Fl. Filip. *pl. 178, C. micracantha.*)

In thickets, Pasay, etc., fl. Jan.–Mar.; widely distributed in the Philippines. India to Malaya.

*4. C. CORDIFOLIA Lam. (*C. mariana* Jacq.). Alcaparro (Sp.-Fil.).

A shrub about 2 m high, unarmed, the younger parts somewhat pubescent. Leaves broadly ovate to suborbicular, soft, base cordate, apex broad and retuse, 4 to 7 cm long. Flowers large, axillary, solitary, long-pedicelled, the sepals green, unequal, concave, the petals very oblique, 3 to 5 cm long, white, turning purplish. Fruit somewhat club-shaped, large. (Fl. Filip. *pl. 179, C. mariana.*)

Parañaque, occasionally cultivated, fl. Sept.–Oct., and probably in other months; introduced from the Marianne Islands. Marianne, Caroline, and Marshalls Islands; Timor.

2. CLEOME Linnaeus

Erect, often rank-scented herbs with digitately 3- to 9-foliolate leaves. Flowers yellow, racemose. Sepals and petals 4 each. Stamens 4 or more, inserted on the disk. Ovary sessile or on a short gynophore; ovules on 2 parietal placentas. Fruit an oblong or linear, 2-valved capsule, the valves separating from the seed-bearing placentas. Seeds small, numerous, reniform. (A Latin plant name of uncertain origin.)

Species about 80, chiefly tropical, 2 in the Philippines, both introduced.

1. C. VISCOSA L.

An erect, branched, annual, glandular-pubescent, somewhat rank-smelling herb 0.3 to 1 m high. Leaves 3- to 5-foliolate, the leaflets 1 to 3 cm long, oblong to obovate-oblong. Flowers in leafy terminal racemes, the pedicels 1 cm long or less. Petals yellow, narrowly obovate, 7 to 8 mm long. Stamens 12 to 20. Capsules cylindric, striate, glandular-pubescent, 4 to 7 cm long, 3 to 4 mm in diameter, narrowed above.

In open waste places, fl. all the year; throughout the Philippines but certainly not indigenous. In all tropical countries.

3. GYNANDROPSIS DeCandolle

An erect, annual, glandular-pubescent or glabrous herb. Leaves digitately 5-foliolate, long-petioled. Flowers in racemes. Sepals and petals 4 each, the latter long-clawed, spreading in bud. Stamens 6, the filaments adnate below to the slender gynophore, spreading above. Ovary long-stalked. Capsule cylindric, elongated, 2-valved, the valves separating from the placentas. Seeds many, small, reniform. (Greek "woman" and "man," in reference to the filaments being adnate to the stalk of the ovary.)

A monotypic genus, found in all tropical countries, but probably introduced here.

1. G. PENTAPHYLLA (L.) DC.

An erect, branched, somewhat pubescent herb 0.4 to 1 m high, the stems usually purplish. Leaflets 5, sessile or nearly so, obovate or oblong-obovate, acute or obtuse, entire or slightly serrulate, 2 to 5 cm long. Racemes terminal, elongated, glandular-pubescent, flowering at the tip, the pedicels about 1.5 cm long, each subtended by a 3-foliolate bract. Sepals lanceolate, green, about 4 mm long. Petals white or tinged with purple, 1 to 1.2 cm long, the blades elliptic to obovate. Gynophore purplish, 1.5 cm long, the filaments 1.5 to 1.8 cm long. Capsules cylindric, 4 to 10 cm long, about 5 mm in diameter. Seeds very numerous, small. (Fl. Filip. *pl. 223.*)

In open dry grass lands, especially near the sea, Pasay, fl. all the year; widely distributed in the Philippines. Tropics generally.

60. MORINGACEAE (MORINGA OR MALUNGAY FAMILY)

Deciduous trees with soft wood. Leaves alternate, 3-pinnate; leaflets opposite, entire, the pinnules jointed to the rachis, usually glandular at the base. Panicles axillary. Flowers perfect, slightly irregular. Calyx cup-shaped, 5-cleft, the segments unequal, petaloid, deciduous from above the base. Petals 5, unequal, the upper one smaller, erect, the lateral ones ascending, anterior one larger, reflexed. Stamens inserted on the edge of the disk, declinate, 5 perfect opposite the petals, alternating with 5, reduced, antherless filaments; anthers dorsifixed, 1-celled. Disk lining the calyx-tube. Ovary stipitate, 1-celled; style slender, tubular; stigma perforated; ovules numerous in 2 series on 3 parietal placentae. Capsule elongated, beaked, 3-angled, loculicidally 3-valved, corky within. Seeds many, in pits on the valves, corky-winged.

A single genus, containing 3 species, natives of western Asia and northern Africa.

1. MORINGA Jussieu

Characters of the Family. (From the Singalese name.)

* 1. M. **OLEIFERA** Lam. (*M. pterygosperma* Gaertn.). Malungay (Tag.); Horse-radish Tree.

A small tree 8 m high or less, bark corky, roots with a pungent taste. Leaves 25 to 50 cm long, usually 3-pinnate; pinnae 4 to 6 pairs; leaflets 3 to 9 on the ultimate pinnules, pale beneath, thin, ovate to elliptic, 1 to 2 cm long. Panicles spreading. Flowers white, 1.5 to 2 cm long. Fertile filaments villous at the base. Ovary hairy. Pod 15 to 30 cm long, pendulous, 3-angled, 9-ribbed. Seeds 3-angled, winged on the angles. (Fl. Filip. *pl. 125.*)

Occasional in our area, but cultivated only, fl. Jan.–May; widely distributed in the Philippines. A native of India, now widely distributed in the tropics and probably introduced into the Philippines in prehistoric times. The leaves are cooked for food.

61. CRASSULACEAE (STONECROP OR SIEMPREVIVA FAMILY)

Succulent, usually perennial herbs. Leaves alternate or opposite, simple or pinnately compound, extipulate. Flowers small to large, cymose, sometimes spicate-racemose or paniculate, regular, perfect or unisexual. Calyx 4- or 5-fid, free. Petals as many as the sepals, free or connate. Stamens hypogynous or upon the petals, as many or twice as many as the petals. Carpels usually as many as the petals, with a hypogynous gland or scale at the base of each, free or connate below; ovules many on the edges of the carpels. Fruit a many-seeded follicle dehiscing down the inner face. Seeds albuminous; embryo terete; cotyledons short.

Genera 13, species about 400, widely distributed, but few in Australia, Polynesia, and South America, 3 genera and 3 or 4 species known from the Philippines.

Calyx-lobes short.. 1. *Bryophyllum*
Calyx-lobes free nearly to the base.. 2. *Kalanchoe*

1. BRYOPHYLLUM Salisbury

Erect, perennial herbs. Leaves opposite, thick, succulent, crenate, simple or 3-foliolate. Flowers large, pendulous, in spreading panicles. Calyx with a long, inflated tube; lobes 4, short, valvate. Corolla with a campanulate tube and a shortly 4-fid limb. Stamens 8, in 2 series, inserted on the middle of the corolla-tube. Hypogynous scales 4, obtuse. Carpels 4, free or connate at the base, attenuated into long styles; ovules very many. Follicles 4, many-seeded. (Greek "swell" or "full" and "leaf" in reference to the thick fleshy leaves.)

Species 4 in tropical Africa, the following throughout the tropics.

1. B. PINNATUM (Lam.) Kurz (*B. calycinum* Salisb.). Catacataca (Tag.); Siempre viva (Sp.). Kalanchoe pinnata (Lam.) P

An erect, more or less branched, glabrous, succulent herb 0.4 to 1.4 m high. Leaves simple or pinnately compound, the leaflets, elliptic, crenate, usually about 10 cm long, thick and succulent. Flowers paniculate, pendulous. Calyx brownish or purplish, 3.5 to 4 cm long, cylindric. Corolla about 5 cm long inflated at the base, then constricted, the exserted parts reddish or purplish, the lobes acuminate. (Fl. Filip. *pl. 147.*)

In thickets and open places, also cultivated, fl. Dec.–March; widely distributed in the Philippines and probably of prehistoric introduction. Tropics of the world, probably originating in Africa.

2. KALANCHOE Adanson

Stout, erect, succulent, perennial herbs, often unbranched, the leaves opposite, or the upper ones alternate, entire or laciniately 2- or 3-fid. Flowers erect, yellow, in many-flowered, subpaniculate cymes. Calyx deeply 4-parted. Corolla salver-shaped, the tube flask-like, narrowed above, the limb spreading, 4-lobed, longer than the calyx, persistent. Stamens 8, in two series, adnate to the corolla-tube. Hypogynous scales 4, linear or oblong. Carpels 4, adnate to the base of the corolla-tube, narrowed into long styles; ovules many. Follicles 4. Seeds very many, oblong, small. (From the Chinese name.)

Species about 60, chiefly in tropical Africa, few in Asia and in tropical America, 2 in the Philippines.

* 1. K. LACINIATA (L.) Pers.

An erect, simple, robust plant less than 1 m in height, quite glabrous. Leaves opposite, fleshy, pinnatisect, 8 to 15 cm long, the lobes distant, spreading, subentire, toothed, or somewhat lobed, lanceolate, distant, few. Inflorescence terminal, peduncled. Flowers about 1.5 cm long, the sepals green, lanceolate, acuminate, the limb of the corolla spreading, about 2 cm in diameter.

Rare in cultivation, Singalon, fl. Jan., and probably in other months, introduced. Tropical Africa through India to China and Formosa, southward to Malaya.

62. PITTOSPORACEAE (PITCHSEED OR MAMALIS FAMILY)

Trees or shrubs, mostly glabrous. Leaves alternate, simple, entire, exstipulate. Flowers 5-merous, perfect, in terminal or axillary corymbose cymes, rarely fascicled. Sepals free or connate below, imbricate. Petals narrow, hypogynous, imbricate, their claws usually connate. Staments 5, opposite the sepals. Ovary incompletely 2- or 3-celled, sessile or shortly stalked; ovules 2 to many on each placenta. Fruit a fleshy, coriaceous, or woody, 1-celled, 2- or 3-valved capsule, the valves bearing placentae in the middle, the seeds few to many, embedded in a resinous or oily pulp.

Genera 9, species about 110, chiefly Australian, 1 genus in the Philippines.

1. PITTOSPORUM Banks

Characters of the Family as given above. (Greek "pitch" and "seed.")

Species about 75, India to Australia and Polynesia, about 8 in the Philippines.

1. **P. pentandrum** (Blanco) Merr. Mamalis (Tag.).

A small tree 4 to 8 m high, glabrous except the inflorescence. Leaves lanceolate, gradually narrowed at both ends, rather slenderly acuminate, 6 to 15 cm long. Panicles 5 to 8 cm long, rusty-pubescent, rather dense, many-flowered. Flowers white, fragrant, about 6 mm long. Fruit subglobose when fresh, pale-yellow, 6 to 8 mm in diameter, resinous inside and with a strong, somewhat turpentine-like odor. Seeds brown, flattened, about 8 in each capsule.

Cementerio del Norte, fl. June–July; widely distributed in the Philippines. Endemic.

63. ROSACEAE (ROSE FAMILY)

Herbs, shrubs, or trees with alternate, simple or compound leaves, usually stipulate. Flowers perfect, regular, rarely irregular. Calyx-tube free or adnate to the ovary, the limb 5-lobed. Petals 5, deciduous, imbricate. Disk lining the calyx-tube or forming a ring at its base. Stamens perigynous, numerous, rarely 5 or 10, in one or many series. Ovary of one or more free or connate carpels, with free or connate, basal, lateral, or terminal styles; ovules 1 or more in each cell. Fruit drupaceous, baccate, or of many achenes on a dry or fleshy receptacle, rarely capsular.

Genera 100, species about 1,500, in all parts of the world, but chiefly in temperate regions, 6 genera and 30 species in the Philippines.

Family description included here as various horticultural forms of the rose (genus *Rosa*) are cultivated in Manila; however, it has been found to be impossible to classify these with any degree of accuracy, hence no descriptions are included. A single indigenous species of the genus occurs in the Mountain Province, Luzon (*Rosa multiflora* Thunb.). Of other representatives of the family occasionally found in Manila, the strawberry, Sp. *fresa* (*Fragaria vesca* L.), is sometimes cultivated. I have seen a single plant of one species of raspberry (*Rubus rosaefolius* Sm.), cultivated, but as it persisted for a few months only it has not been included; the species is widely distributed in the Philippines.

64. CONNARACEAE[1] (CONNARUS OR PALO SANTO FAMILY)

Erect or climbing shrubs or small trees. Leaves alternate, exstipulate, 1- to 3-foliolate or odd-pinnate; leaflets entire. Flowers racemose or panicled, regular, perfect. Calyx 5-lobed, persistent. Petals 5, free or nearly so. Stamens 5 or 10, those opposite the petals often shorter or imperfect. Disk none or small. Carpels usually 5, rarely more or less, free or nearly so, 1-celled, 2-ovuled. Fruit of 1, rarely 2 or 3, sessile or stalked, 1- or 2-seeded follicles, the testa usually arilliform.

Genera 17, species about 175, all tropical; 6 genera and 17 species in the Philippines.

Fruit sessile	1. *Rourea*
Fruit stalked	2. *Connarus*

1. ROUREA Aublet

Scandent shrubs with odd-pinnate leaves, the leaflets entire. Panicles axillary. Flowers small. Sepals 5, orbicular, somewhat enlarged and clasping the base of the ripe capsules. Petals 5, usually linear-oblong. Stamens 10; filaments connate below. Ovaries 5, 4 usually imperfect. Capsules sessile, curved. Seeds arillate. (A name for one or some of the species in French Guiana.)

Species about 50, 2 in the Philippines.

1. **R. erecta** (Blanco) Merr. (*R. multiflora* Planch). Camagsa (Tag.); Palo Santo (Sp.-Fil.).

A suberect or scandent, woody, glabrous shrub 1 to 3 m high. Leaves 15 to 25 cm long, the leaflets 12 to 20, oblong-ovate to oblong-lanceolate, 4 to 8 cm long. Panicles axillary, many-flowered, 5 to 15 cm long. Flowers white or pink, 5 to 7 mm long, very numerous. Pods red, about 1 cm long, sessile, somewhat curved, split down one side, surrounded at the base by the calyx. (Fl. Filip. *pl. 140.*)

In thickets, San Juan del Monte, fl. April-June; widely distributed in the Philippines. Endemic.

2. CONNARUS Linnaeus

Scandent shrubs with odd-pinnate leaves, the leaflets 3 to 5 or more, entire. Panicles axillary and terminal. Flowers small. Sepals clasping the pedicles of the capsules. Petals 5, slightly enlarged upward. Stamens 10, 5 alternating ones shorter than the others. Ovaries 5, pubescent, one perfect, the other 4 imperfect. Capsules oblique, inflated, broader upward, the valves glabrous or pubescent within. Seeds arillate.

Species about 70, all tropical; 10 in the Philippines, a single one in our area.

1. **C. neurocalyx** Planch. Sandaleno (Tag.).

A scandent woody vine 2 to 6 m high, nearly glabrous except the inflorescence. Leaves 25 to 30 cm long. Leaflets 5 to 7, oblong, blunt-acuminate, 8 to 15 cm long, subcoriaceous. Panicles in the upper axils, rusty-pubescent, many-flowered, 10 to 20 cm long. Flowers yellowish-white, fragrant, about 7 mm long. Pods red, 2 to 3 cm long, obovoid, somewhat curved and compressed, short-stalked.

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[1] For a consideration of the known Philippine genera and species see Merrill, E. D., "A Revision of Philippine Connaraceae." *Philip. Journ. Sci.* 4 (1909) *Bot.* 117–128.

In thickets, Masambong, fl. Feb.-March; widely distributed in the Philippines. Endemic.

65. LEGUMINOSAE[1] (BEAN OR NARRA FAMILY)

Annual or perennial herbs or vines, shrubs, or trees. Leaves usually alternate, stipulate, simple, digitate, or pinnate. Flowers in axillary or terminal racemes or panicles, sometimes solitary, bracts and bracteoles usually present. Flowers regular (*Mimosoideae*) or irregular, usually perfect. Calyx truncate or toothed, sometimes 2-lipped, the lobes sometimes free or nearly so. Petals usually 5, sometimes reduced to 1 or 3, equal (*Mimosoideae*) or very unequal. Stamens normally 10, fewer in some genera, or indefinite in some *Mimosoideae;* filaments free or variously combined. Ovary free, superior, 1- to many-ovuled; style simple; stigma capitate, terminal or oblique. Fruit a usually dry or sometimes fleshy pod, splitting down one or both sutures or sometimes indehiscent, or separating into 1-seeded, indehiscent joints. Seeds usually exalbuminous.

One of the largest families, consisting of about 500 genera, and 12,000 species, in all parts of the world, 91 genera and about 290 species in the Philippines.

This vast family is divided into three very natural subfamilies, treated by some authorities as distinct families. They are the *Mimosoideae*, with regular flowers, the petals valvate, free or united above the base, the stamens definite or indefinite; the *Caesalpinioideae*, with irregular flowers, the petals imbricate, the upper one innermost in bud, sometimes reduced to 1 or 3, the stamens definite; and the *Papilionatae*, with very irregular petals, the corolla papilionaceous, that is, butterfly-like, consisting of the upper outer petal, the standard, the four others in two opposite pairs called the keel and the wings, the stamens definite, their filaments variously united. All have in common the characteristic fruit known as a pod or legume, which may be dehiscent or indehiscent, dry or fleshy, and 1- to many-seeded.

1. Petals valvate; flowers regular .... A. *Mimosoideae*
1. Petals imbricate; flowers irregular.
    2. Flowers not papilionaceous, the upper petal interior.
       B. *Caesalpinioideae*
    2. Flowers papilionaceous, the upper petal (standard) exterior.
       C. *Papilionatae*

A. MIMOSOIDEAE

1. Calyx-lobes valvate.
    2. Stamens usually numerous, at least more than twice as many as the petals.

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[1] For a consideration of the known Philippine species see Merrill, E. D., "An Enumeration of Philippine Leguminosae, with Keys to the Genera and Species." *Philip. Journ. Sci.* 5 (1910) *Bot.* 1–136.

3. Filaments more or less connate.

4. Pods indehiscent, septate between the seeds.......... 1. *Enterolobium*

4. Pods dehiscent or indehiscent, not septate between the seeds.

5. Pods strongly spirally twisted.......... 2. *Pithecolobium*

5. Pods straight, thin.......... 3. *Albizzia*

3. Filaments free.......... 4. *Acacia*

2. Stamens as many, or twice as many, as the petals.

3. Anthers not gland-tipped.

4. An erect shrub or small tree; pods straight, flat, smooth. 5. *Leucaena*

4. A suffrutescent, spreading, spiny herb with very sensitive leaves. 6. *Mimosa*

3. Anthers gland-tipped.

4. Pods indehiscent; shrubs or small trees armed with long spines. 7. *Prosopis*

4. Pods dehiscent; unarmed trees.......... 8. *Adenanthera*

1. Calyx-lobes imbricate; large unarmed trees with bipinnate leaves and very numerous small leaflets, the flowers very numerous, in dense obovoid heads.......... 9. *Parkia*

B. CAESALPINIOIDEAE

1. Calyx entire, or the segments above the receptacle more or less united into a toothed or lobed tube.

2. Leaves 2-pinnate; spiny climbing shrubs.......... 10. *Mezoneurum*

2. Leaves simple, 2-cleft or lobed; unarmed shrubs, vines, or trees. 11. *Bauhinia*

1. Calyx-segments free or nearly free above the receptacle.

2. Leaves 2-pinnate.

3. Calyx-segments valvate; large trees with very showy red and yellow flowers and numerous small leaflets.......... 12. *Delonix*

3. Calyx-segments imbricate.

4. Pods not winged; erect, slightly spiny shrubs.......... 13. *Caesalpinia*

4. Pods winged on one or both sutures.

5. Climbing, very spiny shrubs; pods winged along one suture. 10. *Mezoneurum*

5. Erect, unarmed trees with large panicles of showy yellow flowers; pods winged along both sutures.......... 14. *Peltophorum*

2. Leaves 1-pinnate or reduced to single leaflets.

3. Anthers basified, opening by terminal pores; herbs, shrubs, or trees. 15. *Cassia*

3. Anthers versatile, opening by longitudinal slits.

4. Ovary or its stipe more or less adherent to the calyx-tube.

5. Petals 3; pods fleshy.......... 16. *Tamarindus*

5. Petal 1.

6. Perfect stamens 3; seeds not arillate.......... 17. *Intsia*

6. Perfect stamens usually 7; seeds arillate.......... 18. *Pahudia*

4. Ovary quite free from calyx; ovules 1 or 2. rarely 3; petals 5. 19. *Cynometra*

C. PAPILIONATAE

1. Fruit composed of 1-seeded joints which are usually indehiscent.

2. Leaves pinnate.

3. Leaflets numerous, very small; stamens united into two groups of 5 each .... 20. *Aeschynomene*
3. Leaflets few, medium; stamens united in a closed tube; cultivated herbs, the fruit ripening under ground .... 21. *Arachis*
2. Leaves digitately 2-foliolate; joints of the pod muricate.... 22. *Zornia*
2. Leaves pinnately 3-foliolate or reduced to a single leaflet.
3. Pod exserted, equaling or exceeding the calyx.
4. Pod flattened .... 23. *Desmodium*
4. Pod cylindric .... 24. *Alysicarpus*
3. Pod folded together within the calyx.
4. Calyx not enlarged in fruit; leaflets longer than broad; flowers in very dense capitate racemes .... 25. *Uraria*
4. Calyx enlarged in fruit; leaflets broader than long; flowers few in lax racemes .... 26. *Lourea*
1. Pods not jointed, dehiscent or indehiscent.
2. Leaves pinnate, with 5 to many leaves.
3. Leaves odd-pinnate.
4. Pods dehiscing by both sutures.
5. Herbs or undershrubs; flowers racemose.
6. Pods cylindric or 4-angled .... 27. *Indigofera*
6. Pods flat .... 28. *Tephrosia*
5. Trees with flat pods; flowers racemose.
6. Racemes terminal or from the upper axils .... 29. *Millettia*
6. Racemes lateral .... 30. *Gliricidia*
5. Herbaceous vine with large, showy, white or blue, axillary flowers .... 31. *Clitorea*
4. Pods indehiscent.
5. Herbs with subcapitate blue flowers and numerous small leaflets. 32. *Parosela*
5. Trees or woody vines.
6. Leaflets alternate.
7. Trees with yellow flowers and orbicular winged pods. 33. *Pterocarpus*
7. Woody vines with pink or white flowers and elongated narrow pods .... 34. *Dalbergia*
6. Leaflets opposite.
7. Trees with thick wingless pods .... 35. *Pongamia*
7. Woody vines with thin, winged pods .... 36. *Derris*
3. Leaves even-pinnate.
4. Rachis terminating in a tendril .... 37. *Pisum*
4. Rachis not tendril-bearing.
5. Slender vines with short flat pods .... 38. *Abrus*
5. Coarse shrub-like plants with yellow flowers, or trees with very large white flowers; pods very long, subcylindric. 39. *Sesbania*
2. Leaves simple or with 3 or more digitately arranged leaflets; pods inflated.
3. Stamens monadelphous; pods many-seeded .... 40. *Crotalaria*
3. Stamens diadelphous; pods few-seeded .... 41. *Flemingia*
2. Leaves pinnately 3-foliate.
3. Leaflets not stipellate; herbaceous or shrubby, climbing or erect plants.
4. Pods indehiscent; herbs with toothed leaflets and small spiral pods .... 42. *Medicago*

4. Pods dehiscent.
5. Leaves not gland-dotted beneath .... 43. *Pueraria*
5. Leaves gland-dotted beneath.
6. Herbaceous vines.
7. Pods acuminate, scarcely depressed between the seeds. 44. *Dunbaria*
7. Pods obtuse or apiculate, deeply depressed between the seeds .... 45. *Cantharospermum*
6. Erect, shrubby; cultivated .... 46. *Cajanus*
3. Leaflets not stipellate, the stipels replaced by large glands; trees with large red flowers .... 47. *Erythrina*
3. Leaflets stipellate; herbaceous or woody vines.
4. Style not bearded below the stigma.
5. Stamens monadelphous, the vexillary filament more or less united with the others.
6. Nodes of the racemes not swollen .... 46. *Teramnus*
6. Nodes of the racemes swollen.
7. Upper lip of the calyx projecting, distinctly longer than the lower one; pods large, keeled along each side of the dorsal suture .... 49. *Canavalia*
7. Upper lip of the calyx not exceeding the lower one; pods small, not keeled .... 43. *Pueraria*
5. Stamens diadelphous, the vexillary one free from the others.
6. Nodes of the receme not swollen; pods longitudinally ridged, glabrous .... 51. *Centrosema*
6. Nodes of the racemes swollen.
7. Flowers large; petals very unequal; pods large, densely pubescent or covered with stinging hairs .... 52. *Mucuna*
8. Flowers small, petals nearly equal; pods small. 53. *Galactia*
4. Style bearded below the stigma.
5. Stigma oblique.
6. Keel spirally twisted .... 54. *Phaseolus*
6. Keel not spiral.
7. Style filiform; leaflets entire .... 55. *Vigna*
7. Style flattened upward; flowers blue; leaflets toothed; roots large, fleshy, turnip-shaped .... 56. *Pachyrrhizus*
5. Stigma not oblique.
6. Pod flattened, not winged .... 57. *Dolichos*
6. Pod square, 4-winged .... 58. *Psophocarpus*

MIMOSOIDEAE

1. ENTEROLOBIUM Martius

Erect, unarmed, large trees. Leaves evenly bipinnate. Flowers in globose heads, 5-merous, usually perfect. Calyx campanulate, toothed. Corolla funnel-shaped, petals connate to the middle. Stamens monadelphous, much exserted; anthers not gland-crested. Ovary sessile, many-ovuled. Pod strap-shaped, straight, somewhat thickened and fleshy, the mesocarp pulpy and soft, the endocarp firm, the sutures thickened. (Greek "intestine" and "pod.")

Species 5 or 6 in tropical America, the following introduced here.

1. E. **SAMAN** (Jacq.) Prain (*Pithecolobium saman* Benth.). Acacia (Sp.-Fil.); Rain-tree.

A large tree reaching a height of 20 to 25 m, the branches wide-spreading. Leaves evenly 2-pinnate, pinnae 8 to 12, 15 cm long or less; leaflets 12 to 16 in the upper pinnae, 6 to 10 in the lower ones, decreasing in size downward, pubescent beneath, oblong-rhomboid, base and apex more or less oblique, the midnerve diagonal, 1.5 to 4 cm long. Flowers pink, in dense, peduncled, axillary solitary or fascicled heads. Pod straight, somewhat fleshy, indehiscent, 15 to 20 cm long, 2 cm wide, the mesocarp pulpy, sweet. (Fl. Filip. *pl. 309.*)

Very commonly cultivated as a shade tree, decidous in February, fl. March–Sept.; quite generally cultivated in the larger towns in the Philippines. A native of the West Indies, now widely distributed in the tropics in cultivation.

2. PITHECOLOBIUM Martius

Erect trees with 2-pinnate leaves sometimes with spinose stipules. Flowers small, perfect, 5-merous, in globose heads which are solitary, fascicled, or paniculate. Calyx campanulate or funnel-shaped, shortly toothed. Corolla narrowly funnel-shaped, the petals united below the middle. Stamens exserted, monadelphous; anthers not gland-crested. Ovary many-ovuled; style filiform; stigma capitate. Pod strap-shaped, variously falcate, or circinate, usually much twisted at maturity, dehiscent. Seeds arillate or not. (Greek "monkey" and "pod.")

Species about 100, tropical, mostly American, 9 in the Philippines.

1. P. **DULCE** (Roxb.) Benth. Camanchiles, Camonsil (Sp.-Fil.).

A tree 5 to 18 m high, the ultimate branches often pendulous, armed with short, sharp, stipular spines. Leaves evenly 2-pinnate, 4 to 8 cm long; pinnae a single pair, each pinna bearing a single pair of oblique, ovate-oblong, obtuse, 1 to 4 cm long leaflets. Flowers white, in dense heads about 1 cm in diameter, their peduncles solitary or fascicled in the axils of small bracts, along the slender branchlets. Pod turgid, twisted, often spiral, 10 to 18 cm long, about 1 cm wide, dehiscent along the lower suture, the valves red when ripe. Seeds 6 to 8, surrounded by an edible, whitish, pulpy arillus. (Fl. Filip. *pl. 237.*)

Common and widely distributed, fl. Oct.–April. A native of tropical America, now throughly naturalized in the Philippines, and also found in India and Malaya. The local names are corruptions of its old Mexican name *Quamochitl.*

3. ALBIZZIA Durazz

Unarmed trees with 2-pinnate leaves. Flowers small, 5-merous, perfect, pedicelled or sessile in globose heads which are usually paniculate. Calyx campanulate or funnel-shaped, toothed. Corolla funnel-shaped, the petals united below the middle. Stamens many, monadelphous at the base, long-exserted; anthers not gland-crested. Ovary many-ovuled. Pod thin, flat, strap-shaped, straight, not curved or twisted, indehiscent or very tardily so. (In honor of the noble Italian family of Albizzi.)

Species about 30 in the tropics of the Old World, 8 in the Philippines.

1. Leaflets small, never more than 5 cm long.
  2. Flowers sessile; upper half of the leaflets broader than the lower. 1. *A. procera*
  2. Flowers pedicelled; lower half of the leaflets broader than the upper. 2. *A. lebbeck*
1. Leaflets large, the upper ones 10 to 18 cm long.
  2. Pinnae with 2 pairs of leaflets which are pubescent beneath. 3. *A. saponaria*
  2. Pinnae with 1 pair of glabrous leaflets.. 4. *A. acle*

1. **A. procera** (Roxb.) Benth. Aninapla; Acleng-parang (Tag.).

An erect, slightly pubescent or nearly glabrous tree 10 to 25 m high. Leaves about 40 cm long; pinnae 6 to 10, 15 to 20 cm long; leaflets 12 to 20, oblong-elliptic, rounded or retuse, 2 to 5 cm long, somewhat oblique. Panicles terminal or in the upper axils, up to 20 cm long, diffuse. Flowers yellowish-white, in globose heads at the ends of the branchlets, the heads in flower 1 to 1.5 cm in diameter. Pods oblong, thin, smooth, flattened, 10 to 15 cm long, 2 to 2.4 cm wide, containing 8 to 10 seeds.

In open dry lands, Masambong, fl. Sept.; widely distributed in the Philippines. India to Maláya.

*2. A. LEBBECK (L.) Benth. Languil (Tag.).

A nearly glabrous or somewhat pubescent tree 8 to 12 m high. Leaves about 25 cm long; pinnae about 6, 15 cm long; leaflets 6 to 8, oblong, obtuse, somewhat oblique, 2 to 5 cm long, coriaceous. Flowers in long-peduncled, axillary, fascicled heads, the peduncles up to 6 cm in length. Heads in bud, about 2 cm in diameter, in flower, including the anthers, 3 to 4 cm in diameter. Corolla greenish-yellow. Stamens white and green. Pods oblong, coriaceous, 15 to 20 cm long, 2 to 3 cm wide, flat, shining, reticulate, swollen or impressed opposite the seeds. (Fl. Filip. *pl. 316.*)

Occasionally cultivated as shade-tree, fl. March–June; not common in the Philippines, apparently introduced and cultivated only. A native of tropical Africa and Asia, now in most tropical countries.

3. **A. saponaria** (Lour.) Bl. Gogon-toco, Malatoco (Tag.).

A small tree 5 to 10 m high. Leaves 30 to 40 cm long; pinnae 4, the upper pair usually longer than the lower; leaflets 4 to 8, gradually larger toward the ends of the pinnae, 5 to 15 cm long, ovate to elliptic-ovate, acuminate, often inequilateral, more or less pubescent. Panicles terminal, pubescent, spreading, 15 to 30 cm long. Flowers white, crowded in heads at the ends of the ultimate branchlets, heads in flower 1.5 to 2 cm in diameter. Calyx pubescent. Pods thin, flat, 7 to 18 cm long, 2.5 to 3 cm wide, containing 7 to 12 seeds.

In thickets, Masambong, fl. Sept.–Oct.; widely distributed in the Philippines; Malaya.

4. **A. acle** (Blanco) Merr. (*Pithecolobium acle* Vid.). Acle (Tag.).

A tree reaching a height of 20 m or more, glabrous except the inflorescence. Leaves bipinnate, the petiole 2 to 5 cm long; pinnae a single pair; leaflets 4 to 8, the upper ones of each pinna the largest, 8 to 18 cm long. Inflorescence axillary, pubescent, of several short panicles. Flowers 10 to 15 in each head, greenish-white, the calyx 3 mm long, the corolla 7 mm long. Pods 20 to 40 cm long, 3.5 to 5 cm wide, indehiscent, inflated opposite the seeds. Seeds 10 to 12 in each pod, about 2 cm long.

Rarely cultivated, Singalon, fl. April–May. A widely distributed endemic species yielding a valuable timber.

4. ACACIA Willdenow

Spinose or prickly, rarely unarmed, erect or climbing shrubs or small trees. Leaves bipinnate, the leaflets numerous, small, or in one Philippine species represented by phyllodia only. Flowers 5-merous, usually perfect, in globose, axillary, solitary or panicled heads. Calyx toothed, campanulate or funnel-shaped. Petals exserted, united below. Stamens many, free, exserted. Ovary many-ovuled. Pod ligulate or oblong, not jointed, flat or swollen, dehiscent or indehiscent. (Ancient Greek name of a spiny Egyptian tree.)

Species about 450 in all tropical countries, 5 in the Philippines.

Erect shrubs; pods turgid	1. *A. farnesiana*
Climbing shrubs; pods flat	2. *A. rugata*

1. A. FARNESIANA (L.) Willd. Aroma (Sp.-Fil.).

A much branched spiny shrub 2 to 4 m high, the branches more or less zig-zag, lenticellate, the spines stipular, sharp, 1 to 4 cm long, those on the branchlets smaller. Leaves 5 to 8 cm long; pinnae usually 10 to 12; leaflets linear-oblong, 15 to 40, 4 to 7 mm long. Heads axillary, solitary or fascicled, globose, densely many-flowered, about 1 cm in diameter, the peduncles slender, pubescent, 2 to 3.5 cm long. Flowers yellow, fragrant. Pods turgid, 5 to 7 cm long, 1 to 1.5 cm wide, straight or curved.

In waste places, common, fl. Oct.–May; widely distributed and abundant in the Philippines, thoroughly naturalized. Probably a native of tropical America, now found in most tropical countries.

2. **A. rugata** (Lam.) Ham. (*A. concinna* DC.).

A scandent, prickly shrub reaching a height of 4 to 5 m. Branches gray, armed with short, sharp prickles. Leaves 15 to 25 cm long; pinnae 8 to 10 pairs, the rachis with one gland near the base and one or two near the apex; leaflets 20 to 32 pairs, linear-oblong, 8 to 10 mm long, acute, base subtruncate, midrib oblique. Panicles terminal and in the upper axils, ample, the heads yellow, about 1 cm in diameter. Pod straight, somewhat fleshy, wrinkled when dry, flat, 7 to 10 cm long, about 2 cm wide.

In thickets on dry bluffs opposite Fort McKinley, fl. March; of local occurrence in Luzon. India to China and Malaya.

5. LEUCAENA Bentham

Small, erect, unarmed trees. Leaves evenly bipinnate, the leaflets small. Flowers sessile, in dense, globose heads, 5-merous, usually perfect. Calyx cylindric-campanulate, shortly toothed. Petals valvate, free. Stamens 10, free, much exserted; anthers not gland-crested. Ovary stalked. Pod flat, coriaceous, strap-shaped, thin, dehiscent. (Greek "white.")

Species 8, mostly American, the following introduced in the Philippines.

1. L. GLAUCA (L.) Benth. Malaganit, Ipel or Ipel-ipel (Tag.).

A shrub or small tree 2 to 6 m high. Leaves 15 to 25 cm long, rachises pubescent; pinnae 8 to 16, 5 to 9 cm long; leaflets 20 to 30, linear-oblong, acute, inequilateral, 7 to 12 mm long. Heads solitary, axillary, long-peduncled, globose, densely many-flowered, 2 to 5 cm in diameter. Flowers white. Pod thin, flat, strap-shaped, acuminate, 12 to 18 cm long, 1.4 to 2 cm wide, usually many developing from each head of flowers, each containing from 15 to 25, elliptic, compressed, shining, brown seeds. (Fl. Filip. *pl. 400.*)

In thickets, common, fl. all the year; very widely distributed in the Philippines, thoroughly naturalized. A native of tropical America, now found all over the tropics.

6. MIMOSA Linnaeus

Herbaceous prickly plants with bipinnate, sensitive leaves, the leaflets small. Flowers small, in dense, globose heads, polygamous, mostly 4-merous. Calyx campanulate, short-toothed. Petals connate below. Stamens as many as, or twice the number of, the petals, much exserted; anthers not gland-crested. Ovary stalked. Pod flat, membranaceous, made up of 1-seeded joints that on maturity separate from the sutures. (From the Greek "mimic," the sensitive leaves mimicing living animals.)

A very large genus mostly confined to tropical America, a single introduced one in the Philippines.

1. **M. PUDICA** L. Macahia (Tag.); Sensitive Plant.

A diffusely spreading, suffrutescent herb, the stems branched, up to 1 m in length, sparingly prickly and with numerous deflexed bristly hairs. Leaves very sensitive, both the pinnae and the leaflets falling when touched; pinnae usually 4, digitately arranged at the end of each petiole, 4 to 9 cm long; leaflets narrowly oblong, inequilateral, acute, 1 to 1.5 cm long, sessile, sparingly bristly. Heads long-peduncled, solitary or 2 or 3 in each axil, nearly 1 cm in diameter. Flowers pink, very numerous. Stamens 4. Pods flat, slightly recurved, numerous, 1 to 2 cm long, made up of from 3 to 5, 1-seeded joints that at maturity fall away from the persistent, armed, sutures which bear numerous, weak, spreading, yellowish-white bristles. (Fl. Filip. *pl. 253.*)

In open waste places, very common, fl. all the year; throughout the Philippines. A native of tropical America, now found in all tropical countries.

7. PROSOPIS Linnaeus

Erect shrubs or trees with stout spines. Leaves 2-pinnate, the leaflets numerous, small. Flowers polygamous, small, in spikes or spike-like racemes. Calyx small, campanulate, entire or slightly 5-toothed. Petals 5, ligulate, somewhat coherent at the base. Stamens 10, free, somewhat exserted; anthers crowned with a gland. Ovary many-ovuled. Pod turgid, narrowly oblong, somewhat curved, the mesocarp fleshy, septate between the seeds. (An ancient Greek plant name of uncertain application.)

Species 25 or more in most tropical countries, 1 introduced in the Philippines.

1. **P. VIDALIANA** Naves. Aroma (Sp.-Fil.).

A shrub or a small tree 2 to 6 m high, glabrous throughout, the branches armed with numerous, long, sharp spines. Leaves bipinnate, solitary or somewhat fascicled, each leaf or fascicle subtended by a pair of 1.5 to 4 cm long spines, mostly with 2 pairs of 5 to 10 cm long pinnae. Leaflets numerous, linear-oblong, about 1.5 cm long, obtuse. Spikes axillary, 8 to 10 cm long. Flowers numerous, yellowish or straw-colored, spreading, including the stamens about 7 mm long. Pods 15 to 20 cm long, nearly 1 cm wide, somewhat compressed, rather strongly curved, containing about 20 seeds. (Fl. Filip. *pl. 392.*)

Abundant along the Pasay beach, and along and near some tidal streams, fl. Sept.–March; very abundant about Manila Bay, and in a few other localities in the Philippines, undoubtedly introduced from Mexico.

8. ADENANTHERA Linnaeus

Erect unarmed trees with 2-pinnate leaves. Flowers small, perfect, 5-merous, in spike-like racemes. Calyx campanulate, toothed. Petals valvate, cohering at the base, lanceolate. Stamens 10, free; anthers gland-tipped. Ovary sessile, many-ovuled. Pod strap-shaped, falcate, the valves coriaceous, twisted after dehiscence. Seeds 2-colored. (Greek "gland" and "anther" from the gland-tipped anthers.)

Species 5 or 6 in most tropical countries, 1 in the Philippines.

1. **A. intermedia** Merr. Malasagad, Tañglin (Tag.).

An erect glabrous tree 10 to 15 m high. Leaves 25 to 40 cm long; pinnae 4 to 6, 10 to 20 cm long; leaflets 5 to 9, elliptic, truncate or slightly retuse, when dry dark above, pale beneath, 2 to 4 cm long. Racemes in the upper axils, solitary or paniculate, 12 to 20 cm long, slender. Flowers numerous, brownish, about 3 mm long, their pedicles slender. Pods narrowly oblong, about 15 cm long 1 to 1.3 cm wide, containing 8 to 12, somewhat compressed, 8 mm long shining seeds, half red and half black.

Cementerio del Norte, fl. Aug.–Oct.; widely distributed in the Philippines. Endemic.

9. PARKIA R. Brown

Tall, unarmed trees with evenly bipinnate leaves, the leaflets very numerous, small. Flowers in dense, long-peduncled, obovoid heads. Calyx tubular, shortly 5cleft, the lobes imbricate. Corolla tubular, somewhat cleft. Stamens 10, exserted, the filiform filaments in the lower part united with each other and with the corolla-tube; anthers gland-tipped. Ovary stalked, Pod large, flat, strap-shaped coriaceous, very tardily dehiscent. (In honor of M. Park, an African traveler.)

A genus of about 10 species, in the tropics of both hemispheres, 2 in the Philippines.

1. **P. timoriana** (DC.) Merr. Cupang (Tag.).

A very large tree 25 to 40 m high. Leaves evenly bipinnate, 30 to 80 cm long; pinnae 40 to 60, 8 to 20 cm long; leaflets 60 to 140, linear-oblong, falcate, 6 to 12 mm long, close set, shining above, acute. Heads dense, obovoid or pyriform, axillary, long-peduncled, up to 6 cm in length. Flowers white and yellow, about 1 cm long. Pods 25 to 30 cm long, about 3.5 cm wide, rather thick, pendulous, black and shining when mature, containing from 15 to 20 seeds.

A single tree in the old botanic garden, fl. Nov.; widely distributed in the Philippines. Timor, its other range uncertain.

CAESALPINIOIDEAE

10. MEZONEURUM Desfontaines

Woody, prickly climbers with abruptly 2-pinnate leaves. Flowers in panicled racemes. Calyx very oblique, usually deeply cleft, the disk mostly basal, the lobes imbricate, the lowest one hooded, larger than the others. Petals obovate, spreading, subequal. Stamens free, declinate, exserted. Ovary many-ovuled; style filiform, incurved. Pod oblong, flat, thin, indehiscent, with a broad wing extending down the upper suture. (Greek "middle" and "nerve," in allusion to the nerved pods.)

Species 10 in the tropics of the Old World, 3 in the Philippines.

1. **M. pubescens** Desf. Camat-cabag, Dauag (Tag.).

A scandent, woody, very spiny vine reaching a length of from 3 to 5 m. Leaves 30 to 50 cm long, the rachis softly pubescent, armed with stout, sharp, recurved spines; pinnae 24 to 30; leaflets 12 to 20, oblong, thin, pubescent, 1 to 2 cm long. Panicles terminal, many-flowered, pubescent, 15 to 25 m long. Flowers yellow, about 3 cm in diameter. Pods oblong, thin, indehiscent, 11 to 13 cm long, about 3.5 cm wide including the thin, 8 mm wide wing along the dorsal suture.

In open dry lands and thickets, La Loma to San Pedro Macati, fl. Sept.–Nov.; of very local occurrence in the Philippines. Timor.

11. BAUHINIA Linnaeus

Erect shrubs or trees or climbing vines, sometimes with circinate tendrils. Leaves simple, usually deeply cleft from the tip, rarely entire. Flowers usually showy, in simple or panicled racemes. Calyx-tube short or long, the limb entire and spathe-like or 2- to 5-cleft. Petals 5, subequal, usually clawed. Stamens 10, or reduced to 5, 3, or 1, when fewer than 10 usually with sterile filaments. Ovary many-ovuled; style short or long; stigma often peltate. Pod linear to oblong, flat, dehiscent or indehiscent. (In honor of K. Bauhin, an early Swiss botanist.)

Species about 150 in all tropical countries, 18 in the Philippines.

1. Fertile stamens 10; shrubs.
    2. Tips of leaf-lobes rounded; flowers yellowish, solitary or in pairs; pods pubescent........ 1. *B. tomentosa*
    2. Tips of leaf-lobes acute; flowers white, racemose; pods glabrous. 2. *B. acuminata*
1. Fertile stamen 1; a tree........ 3. *B. monandra*

* 1. B. TOMENTOSA L.

An erect, branched shrub 1.5 to 3 m high, the branchlets, lower surfaces of the leaves, and the pods somewhat pubescent. Leaves 4 to 7 cm long, about as wide, split about one-third to the base into two, ovate, rounded lobes. Flowers pale-lemon-yellow, usually in pairs on axillary peduncles. Calyx-limb spathaceous, split down one side. Petals about 5 cm long, 4 cm wide. Stamens 10, all fertile, unequal in length, the filaments 1 to 2 cm long. Pod 9 to 11 cm long, about 1.5 cm wide, flattened, acuminate, containing 6 to 10 seeds. (Fl. Filip. *pl. 119, B. binata.*)

Cultivated for ornamental purposes, fl. most of the year. A native of India, now rather widely distributed in the tropics in cultivation and as an escape.

2. B. ACUMINATA L.

An erect shrub 2 to 4 m high, somewhat pubescent. Leaves 7 to 13 cm long, 6 to 12 cm wide, base somewhat cordate, 9- to 11-nerved, the lobes acute or slightly acuminate, about one-third the length of the leaf. Racemes axillary, short, few-flowered. Calyx green, about 3 cm long, split down one side, acuminate, the apex with 5, short, slender teeth. Corolla white, about 8 cm in diameter. Stamens 10, shorter than the petals, all acuminate, glabrous, containing 7 to 9 seeds. (Fl. Filip. *pl. 111.*)

In dry thickets opposite San Pedro Macati, also cultivated, fl. Aug.–Oct.; of local occurrence in the Philippines, and surely introduced. India to China and Malaya.

*3. B. MONANDRA Kurz.

A small or medium-sized tree, the branches long, spreading. Leaves 11 to 15 cm long and wide, cleft about half way to the base, the lobes rounded or obtuse, base broadly cordate, 13-nerved. Racemes few-flowered, axillary. Calyx 2.5 cm long, split to the base on one side. Corolla about 10 cm in diameter, the petals spreading, not at all imbricate, narrowly obovate, long-clawed, pink-purple with numerous, small, darker dots, the upper petal much darker purple than the others. Stamen 1, as long as the style and ovary. Pod stout, thick, about 20 cm long, 2.5 to 3 cm wide. (Fl. Filip. *pl. 82, B. subrotundifolia.*)

Cultivated for ornamental purposes, fl. most of the year. Probably a native of tropical America, now found in many tropical countries.

12. DELONIX Rafinesque

Large unarmed trees, the leaves bipinnate, the leaflets small, numerous. Flowers large and showy, red or yellowish, in racemes at the ends of the branches forming leafy panicles. Calyx-tube disk-like or shortly turbinate, with 5, subequal, valvate segments. Petals 5, spreading, clawed, the limbs orbicular, the upper one differing somewhat in shape and involute at the base. Stamens 10, free, declinate, villous below. Ovary sessile, many-ovuled. Pod large, elongated, woody, compressed, 2-valved, many-seeded.

Species 3 in tropical Africa and Asia, 1 introduced in the Philippines.

*1. D. REGIA (Boj.) Raf. (*Poinciana régia* Boj.). Caballero, Arbol del fuego (Sp.-Fil.); Flame Tree, Fire Tree, Flamboyant.

A deciduous tree reaching a height of 20 m or more, slightly pubescent or nearly glabrous. Leaves 20 to 40 cm long, with small, decidous, pinnate stipules; pinnae opposite, 15 to 20 pairs, 7 to 15 cm long, leaflets oblong, obtuse, 18 to 30 pairs 1 cm long or less. Racemes in the uppermost axils, the inflorescence 20 to 40 cm long. Flowers long-pedicelled, red or red and yellow, 10 to 12 cm in diameter. Pods pendulous about 50 cm long and 5 cm wide. (Fl. Filip. *pl. 451.*)

Commonly planted for ornament, fl. March–July; now found in cultivation in most large towns in the Philippines, probably introduced about the middle of the last century. A native of Madagascar and tropical Africa, now cultivated in most tropical countries.

13. CAESALPINIA Linnaeus

Shrubs, trees, or prickly climbers. Leaves large, abruptly 2-pinnate, the leaflets large or rather small. Flowers usually showy, yellow or red, in many-flowered, axillary racemes. Calyx deeply cleft, the disk basal, the lobes imbricate, the lowest one larger than the others. Petals spreading, usually orbicular, usually clawed, the uppermost smaller than the others. Stamens 10, free, declinate; anthers versatile. Ovary few-ovuled. Pod oblong or ligulate, flat or inflated, smooth or spiny, dehiscent or indehiscent. (In honor of A. Cesalpini, an early Italian botanist.)

Species about 40 in all tropical countries, 6 in the Philippines.

1. Pods armed with numerous slender spines; a spiny vine........ 1. *C. crista*
1. Pods glabrous.
   2. A scandent prickly vine; leaflets few, 2 or 3 pairs on each pinna. 2. *C. nuga*

2. Shrubs or trees; leaflets many, 7 or more pairs on each pinna.
   3. Stamens several times as long as the petals; pods about 2 cm wide. 3. *C. pulcherrima*
   3. Stamens not or but little longer than the petals; pods 3 to 4 cm wide. 4. *C. sappan*

1. **C. crista** L. (*C. bonducella* Flem.). Calumbibit (Tag.).

A scandent woody vine reaching a length of 10 m or more, the stems very spiny. Leaves bipinnate, often nearly 1 m long, the rachis armed with stout, sharp, recurved spines; pinnae usually about 10 pairs, about 20 cm long, with a pair of short sharp spines at the attachment of each pair of leaflets. Leaflets about 10 pairs, oblong, obtuse or acute, somewhat pubescent, 2 to 5 cm long. Racemes axillary, simple or panicled, dense at the top. Flowers yellow, about 1 cm long. Pods 5 to 7 cm long, oblong, inflated, covered with slender spines. Seeds large, one or two, subglobose, hard, gray, shining.

In thickets especially near the sea, fl. Sept.–Jan.; throughout the Philippines near the seashore. Cosmopolitan in the tropics.

2. **C. nuga** (L.) Ait. Sapinit (Tag.).

A glabrous, scandent shrub reaching a length of 10 m or more, the branches armed with short, stout, hard, hooked prickles. Leaves bipinnate, 20 to 30 cm long, the rachis armed with recurved spines beneath; pinnae 6 to 8, rather distant; leaflets 4 to 6 on each pinna, coriaceous, shining, ovate to elliptic-ovate, acute, 2 to 5 cm long. Panicles terminal, ample, many-flowered. Flowers yellow, racemosely arranged, about 1 cm in diameter. Stamens woolly at the base, slightly exserted. Pods 4 to 5 cm long, 2.5 to 3 cm wide, beaked, hard, indehiscent, containing a single seed. (Fl. Filip. *pl. 150.*)

In thickets near the seashore or within the influence of brackish water, Pasay, fl. all the year; throughout the Philippines near the sea. Tropics of the world.

3. C. PULCHERRIMA (L.) Sw. Caballero (Sp.-Fil.).

An erect, glabrous, sparingly spiny shrub or small tree 1.5 to 8 m high. Leaves bipinnate; pinnae 4 to 8 pairs, 6 to 12 cm long; leaflets sessile, 7 to 11 pairs, obtuse, elliptic, 1 to 2 cm long. Racemes terminal, lax, the pedicels long, slender. Flowers red and yellow, or yellow, about 4 cm in diameter, the petals crisped, clawed; stamens long-exserted. Pods 5 to 9 cm long, 1.5 cm wide. (Fl. Filip. *pl. 112.*)

Commonly cultivated for ornamental purposes, fl. all the year. A native of tropical America, introduced here at an early date, and naturalized. Now everywhere in the tropics.

4. C. SAPPAN L. Sappang, Sibucao (Tag., Vis.).

A small tree 3 to 5 m high, with scattered prickles. Leaves up to 50 cm long; pinnae about 20, opposite, 10 to 20 cm long; leaflets 20 to 30, oblong to oblong-rhomboid, very oblique, attached at the lower corner, apex usually retuse. Panicles often as long as the leaves, terminal. Flowers yellow, 2 to 2.5 cm in diameter, the filaments densely woolly in the lower one-half. Pods oblong to oblong-obovate, hard, indehiscent, shining, about 7 cm long, 3.5 to 4 cm wide, with a hard recurved beak at the upper angle. (Fl. Filip. *pl. 121.*)

In thickets, San Pedro Macati, fl. Aug.–Sept.; common and widely distributed in the Philippines, but probably introduced. India and Malaya.

14. PELTOPHORUM Vogel

Unarmed trees with abruptly bipinnate leaves and showy yellow flowers in ample terminal and axillary panicles. Calyx deeply cleft, the lobes imbricate. Petals oblong or roundish, spreading. Stamens 10, free, declinate, the filaments with a dense tuft of hairs at the base; anthers uniform. Ovary sessile, free, few-ovuled; stigma large, peltate. Pod oblong, flat, indehiscent, winged along both sutures. Greek "shield" and "to bear," from the peltate stigma.)

Species about 6 in most tropical countries, 1 in the Philippines.

1. **P. inerme** (Roxb.) Naves (*P. ferrugineum* Benth.).

A tree usually 8 to 15 m high with a dense crown of spreading branches, the younger parts and inflorescence brown-tomentose. Leaves 25 to 40 cm long; pinnae opposite, 10 to 15 pairs, 5 to 12 cm long; leaflets oblong, 10 to 15 pairs, somewhat oblique, obtuse or retuse 10 to 18 mm long. Panicles 10 to 20 cm long. Calyx brown-tomentose. Petals yellow, obovate, about 2 cm long. Pods oblong, 5 to 8 cm long, glabrous, closely longitudinally veined, 1- to 4-seeded. (Fl. Filip. *pl. 335.*)

Commonly cultivated as a shade-tree, fl. March–April; of local occurrence along the seashore in the Philippines. Ceylon, through Malaya to northern Australia.

15. CASSIA Linnaeus

Erect trees, shrubs, or herbs. Leaves abruptly pinnate. Flowers usually large and showy, in axillary and terminal racemes or panicles. Calyx-tube short, the sepals imbricate. Petals 5, subequal. Stamens 10, rarely all perfect, 3 to 5 being reduced to staminodes or sometimes absent; anthers mostly basifixed, opening by terminal pores or with the slit more or less continued downward. Ovary sessile or stalked. Pod very variable, terete or flat, dehiscent or indehiscent, usually septate between the seeds. (An ancient name, derivation obscure.)

A very large genus in all tropical regions, and a few species in temperate countries, about 12 in the Philippines.

1. Trees .... 1. *C. siamea*
1. Undershrubs, shrubs, or suffrutescent herbs.
    2. Leaves with glands on the common rachis; suffrutescent herbs or undershrubs.
        3. Leaflets obtuse; seeds rhombohedral .... 2. *C. tora*
        3. Leaflets acuminate, seeds compressed.
            4. Plant glabrous or nearly so .... 3. *C. occidentalis*
            4. Plant pubescent .... 4. *C. hirsuta*
    2. Leaves without glands on the rachis; a coarse branched shrub with large leaves, racemose bracteate flowers, and winged pods. 5 *C. alata*

1. C. SIAMEA Lam. (*C. florida* Vahl). Acacia (Sp.-Fil.).

A tree 8 to 12 m high, the branches spreading. Leaves equally pinnate, 15 to 25 cm long; leaflets 8 to 14, opposite, oblong, obtuse or retuse, 2 to 5 cm long. Panicle large, erect, terminal, 15 to 30 cm long, extending into the upper axils, composed of alternate corymbs. Flowers yellow, about 2.5 cm in diameter. Stamens 7, the other 3 upper ones reduced to staminodes; the lower 3 larger than the lateral ones. Pods nearly straight, thin, flat, 15 to 20 cm long, 1.2 to 1.4 cm wide, containing 15 to 25 seeds. (Fl. Filip. *pl. 426.*)

Commonly cultivated as a shade tree, not spontaneous, fl. June–Dec.; introduced from India or Malaya. India to Cochin China, the Malay Peninsula and Archipelago.

2. C. TORA L.

Stout, erect, glabrous, rank-smelling, suffrutescent annual 1 m high or less. Leaves 8 to 12 cm long, the stipules linear-subulate; leaflets 6, obovate to oblong-obovate, obtuse, apiculate, 2 to 5 cm long. Flowers axillary, in pairs, the peduncle very short, the pedicels 2.5 cm long or less. Corolla yellow, 1.5 cm in diameter. Pod slender, up to 15 cm long, 3 to 4 mm thick. (Fl. Filip. *pl. 122.*)

In open waste places, very common, fl. all the year; throughout the Philippines. A native of tropical America, now in most tropical countries.

3. C. OCCIDENTALIS L.

An erect, somewhat branched, glabrous, suffrutescent herb or a shrubby plant 0.8 to 1.5 m high. Leaves pinnate, about 20 cm long, the rachis with a large gland at the base. Leaflets rank-smelling, 5 pairs, oblong-lanceolate, acuminate, 4 to 9 cm long. Racemes few-flowered, axillary and terminal, corymbose. Flowers yellow, 2 cm long. Pods about 10 cm long, 9 mm wide, thickened, containing about 40 seeds. (Fl. Filip. *pl. 73.*)

In open waste places, fl. all the year. Widely distributed in the Philippines. A native of tropical America, now in most tropical countries.

4. C. HIRSUTA L.

An erect, branched, annual, suffrutescent herb or undershrub 0.6 to 1.4 m high. Leaves equally pinnate, 15 to 30 cm long; leaflets 8 to 12, ovate to oblong-ovate, acuminate, more or less pubescent, 4 to 10 cm long. Flowers yellow, about 2 cm in diameter, in pairs in the axils of the leaves or in terminal, somewhat crowded panicles. Pods 15 to 25 cm long, about 5 mm wide, pubescent, the seeds very numerous.

Occasional in open waste places, fl. Nov.–Jan. Of local occurrence in the Philippines. A native of tropical America, now pantropic.

5. C. ALATA L. Acapulco, Capulco, Capurco (Tag.).

A coarse, erect, branched shrub 1.5 to 3 m. high, the branches stout, green. Leaves equally pinnate, 40 to 60 cm long; leaflets 16 to 28, oblong, apex broad, rounded, apiculate, 5 to 15 cm long, gradually increasing in size upward. Inflorescence of terminal and axillary, simple or panicled spike-like, peduncled racemes, 10 to 50 cm long. Flowers yellow, about 4 cm in diameter, the buds subtended by thin, yellow, oblong, concave bracts, 2.5 to 3 cm long, which are imbricate and conceal the buds, falling as the flowers open. Upper 3 stamens reduced to staminodes, the lower two with large anthers, the lateral pairs small. Pods straight, spreading, about 15 cm long, 1.5 cm wide, valves with a crenulated, chartaceous wing running from end to end. Seeds 50 to 60, flattened, triangular. (Fl. Filip. *pl. 124.*)

In open waste places, fl. Oct.–Jan.; widely distributed in the Philippines in and about towns. Tropics of the World, a native of tropical America.

Cassia glauca Lam., a native of south-eastern Asia, was introduced and cultivated in the old Botanic Garden in Spanish times. It seems not to have persisted. It is a tree, the flowers with 10 perfect stamens.

16. TAMARINDUS Linnaeus

A large, unarmed tree with abruptly pinnate leaves. Flowers in axillary racemes. Calyx-tube turbinate, the teeth lanceolate, much imbricated, the lower two connate. Only the three upper petals developed, the two lateral ones ovate, the upper hooded, the two lower ones reduced to scales. Stamens monadelphous, only 3 developed, the others reduced to mere bristles at the top of the sheath. Ovary many-ovuled, the stalk adnate to the calyx-tube. Pod oblong, indehiscent, thick, the mesocarp fleshy, containing several seeds. (Latinization of the Arabic "date" and "Indian," literally "Indian date.")

A single species now planted in all tropical countries.

*1. T. INDICA L. Sampaloc (Tag.); Tamarindo (Sp.); Sambac (Vis.); Salomague (Il.); Tamarind.

A large tree 12 to 20 m high, nearly glabrous. Leaves even-pinnate, 6 to 10 cm long; leaflets 20 to 40, rather close, oblong, obtuse, 1 to 2 cm long. Racemes mostly axillary, sometimes panicled, 5 to 10 cm long. Calyx about 1 cm long. Petals yellowish with pink stripes, obovate-oblong, less than 1 cm long. Pods oblong, thickened, 6 to 15 cm long, 2 to 3 cm wide, slightly compressed, the epicarp thin, crustaceous, the mesocarp pulpy, acid, edible. (Fl. Filip. *pl. 14.*)

Commonly cultivated, fl. April–Oct.; widely distributed in the Philippines, introduced in prehistoric times. Probably a native of tropical Africa, but now cultivated in all tropical countries.

17. INTSIA Thouars

Erect, unarmed trees with even-pinnate leaves of few large opposite leaflets. Flowers in terminal panicles. Calyx with the disk produced to the top of the elongated tube, the lobes slightly unequal, imbricated. Petals one only developed, orbicular, with a distinct claw, the others absent or rudimentary. Stamens 3 perfect, imperfect ones usually present, the filaments long, pilose. Pods large, flat, oblong, somewhat woody, 3- to 6-seeded. Seeds not arillate. (From the native Madagascar name of one species.)

Species 6, tropics of the Old World, 2 or 3 in the Philippines.

1. **I. bijuga** (Colebr.) O. Kuntze (*Afzelia bijuga* A. Gray). Ipil (Tag., Vis.).

An erect, nearly glabrous tree, 5 to 25 m high. Leaves even-pinnate, the leaflets 4, rarely only 2, opposite, glabrous, base somewhat oblique, apex retuse or rounded, 5 to 10 cm long. Panicles terminal or leaf-opposed, pubescent, corymbose, 6 to 10 cm long. Calyx pubescent, the lobes about 8 mm long. Petal somewhat exceeding 1 cm in length, the limb about 1 cm wide, white or pink. Fertile stamens 3. Ovary stalked, pubescent on both sutures, exserted. Pod 10 to 25 cm long, 4 to 6.5 cm wide, thickly coriaceous, containing from 3 to 6 orbicular seeds.

Singalon and Cementerio del Norte, cultivated, fl. in June and probably in other months; throughout the Philippines near the seashore. Tropical shores from Madagascar, through Malaya to the Caroline Islands and Fiji.

18. PAHUDIA Miquel

Unarmed trees with even-pinnate leaves. Flowers in terminal panicles. Calyx pubescent, the tube elongated, the limb 4-lobed, the lobes imbricate. Petal 1, shortly clawed, broadly orbicular, the others rudimentary or none. Stamens 9 with 7 perfect, rarely 7 with 5 perfect, filaments more or less united, or free. Ovary stalked, stalk adnate to the calyx-tube. Pod oblong to rhomboid, thick, woody, 2-valved, dehiscent, septate between the seeds. Seeds ovate to oblong, base arillate. (In honor of C. F. Pahud.)

Species 8, British India to Malaya and tropical Africa, 1 in the Philippines.

1. **P. rhomboidea** (Blanco) Prain (*Afzelia rhomboidea* Vid.). Tindalo (Tag.); Balayong (Vis.).

A tree reaching a height of 25 m, glabrous except the inflorescence. Leaves simply pinnate, up to 25 cm long; leaflets usually 8, opposite, oblong-ovate to elliptic-ovate, acuminate, shining, 5 to 8 cm long. Panicles terminal and axillary, pubescent, equaling or shorter than the leaves. Calyx green, pubescent. Petal yellowish-red. Pod woody, thick, somewhat rhomboid, about 20 cm long, 8 to 10 cm wide, about 8-seeded, the seeds black, more than one-half enclosed by the orange-red aril. (Fl. Filip. *pl. 281.*)

Immature specimens in Singalon in cultivation. A widely distributed, endemic, valuable timber tree, in regions near Manila fl. Aug.–Sept.

19. CYNOMETRA Linnaeus

Erect, usually glabrous shrubs or trees. Leaves alternate, pinnate, the leaflets coriaceous, entire, opposite, few, unequal, or the leaves sometimes simple. Flowers numerous, small, bracteate, in axillary fascicles, short racemes, or corymbs. Calyx-tube very short, disk subbasal, the lobes 4 or 5, oblong, imbricate. Petals 5, oblanceolate, equal. Stamens 10, the filaments free, exserted. Ovary sessile or short-stalked, 2-ovuled. Pod turgid or flat, indehiscent, often very thick and usually rugose. (Greek "dog" and "womb" from the shape of the pod of some species.)

Species 25 or more, in all tropical countries, about 7 in the Philippines.

1. **C. simplicifolia** Harms.

A tree, reaching a height of 15 m or more, glabrous. Leaves simple, coriaceous, short-petioled, oblong-ovate to elliptic-ovate, apex obscurely acuminate, the base usually rounded, 5 to 9 cm long, green and shining on the upper surface, the lower surface somewhat glaucous when fresh. Flowers small, white, in 5 to 10 mm long, many-flowered, axillary racemes. Petals narrowed below. Pods 2 to 3 cm long, obliquely oblong, flattened.

In thickets near San Francisco del Monte; rather widely distributed in the Philippines. Endemic.

Cynometra cauliflora L., a Malayan species, was formerly cultivated in Manila, but appears no longer to be found here; it is characterized by its leaves having one pair of leaflets, and its flowers being borne in racemes that spring from the trunk and larger branches.

PAPILIONATAE

20. AESCHYNOMENE Linnaeus

Erect branched herbs, the leaves with very numerous, close, sensitive, odd-pinnate, small, linear leaflets. Flowers small, in few-flowered racemes. Calyx deeply 2-lipped, the lips somewhat toothed. Standard orbicular; keel not beaked. Stamens in 2 bundles of 5 each. Pod linear, stalked, flat, 4- to 8-seeded, ultimately separating into 1-seeded points. (Greek "being ashamed," from the sensitive leaflets.)

Species about 30 in all tropical countries, 1, probably introduced, in the Philippines.

1. A INDICA L.

An erect, branched, suffrutescent, annual herb 0.3 to 1.2 m high, glabrous, the branches green, cylindric. Leaf-rachis 3 to 5 cm long, the leaflets small, linear or oblong, numerous, obtuse, 1-nerved, close, about 5 mm long; stipules lanceolate, 1 cm long, deciduous, produced below the point of attachment. Racemes axillary, short, 1- to 4-flowered. Flowers about 8 mm long, yellow and purplish. Pod linear-oblong, straight or curved, 1 to 3 cm long, about 3 mm wide, composed of from 4 to 8 joints.

In open wet grass lands, fl. all the year; throughout the Philippines, but probably introduced. Tropics of the Old World, extending to Japan.

21. ARACHIS Linnaeus

Low, usually prostrate herbs with even-pinnate leaves, the leaflets 2 or 3 pairs, not stipellate. Flowers yellow, crowded in short, axillary spikes, or pedicelled in the axils of the leaves. Calyx-tube slender, the 4 upper wings oblong; keel incurved, beaked. Filaments united in a closed tube, some anthers versatile, the alternating ones subbasifixed. Pod oblong-cylindric, reticulate, indehiscent, torulose but not jointed, maturing under the surface of the ground. (Ancient Greek name for some leguminous plant.)

Species 7, all tropical American, 1 now cultivated in all warm countries.

*1. A. HYPOGAEA L. Mani (Sp.); Peanut.

An annual, spreading, hairy, branched herb, the stems 30 to 80 cm long. Leaves 8 to 12 cm long, the base of the petiole clasping, the sheath produced in 2 linear-lanceolate stipules. Leaflets oblong to obovate, 2 to 5 cm long. Flowers axillary, few, fascicled, yellow, about 8 mm long. Pods ripening under ground, oblong, leathery, reticulate, 1 to 5 cm long, containing from 1 to 3 seeds. (Fl. Filip. *pl. 157.*)

Commonly cultivated, fl. Dec.–March. A native of tropical America now widely distributed in cultivation in most tropical and subtropical countries.

22. ZORNIA Gmelin

Slender annual herbs, gland-dotted, the leaves compound, leaflets in 1 or 2 opposite pairs. Flowers small, in lax racemes, enclosed by lanceolate, paired bracts. Calyx small, the upper teeth short, connate. Corolla exserted. Stamens monadelphous, the anthers dimorphous. Ovary many-ovuled. Pod of several, rounded, flattened, finely prickly, indehiscent, 1-seeded joints. (In honor of J. Zorn, an early German physician and botanist.)

Species 10, all of tropical America, except 2; 1, probably introduced, in the Philippines.

1. Z. DIPHYLLA (L.) Pers.

Glabrous, the stems slender, wiry, branched, spreading or ascending from the rather stout root, up to 40 cm in length. Leaflets 2, lanceolate, acute or acuminate, 1 to 2.5 cm long; stipules lanceolate, produced below the point of insertion. Racemes 2 to 6 cm long, slender, 3- to 15-flowered. Flowers small, yellow, quite hidden by the paired, lanceolate, acuminate, persistent bracts which are 8 to 10 mm long and tailed at the base. Pod of 2 to 6, round, prickly joints about 2 mm wide.

In open dry grass lands, San Pedro Macati, fl. Nov.–Jan.; of local occurrence in the Philippines, probably introduced. Most tropical countries, possibly originating in tropical America.

23. DESMODIUM Desvaux

Herbs, shrubs, or small trees with simple or 3-foliolate stipulate leaves. Flowers small, white, pink, red, or purplish, in few- to many-flowered axillary or terminal racemes or umbels, sometimes panicled. Calyx-teeth longer or shorter than the tube, the upper two often subconnate. Corolla exserted; standard broad; wings more or less adhering to the usually obtuse keel. Upper stamen free or partly so, the other 9 united. Ovary few- to many-ovuled. Pod usually composed of few to many, 1-seeded, indehiscent, compressed joints, smooth or covered with minute hooked hairs. (Greek "bond" or "chain," allusion to the jointed pods.)

Species 130 or more, in all tropical countries, a few in temperate regions, 30 in the Philippines.

1. Leaves 3-foliolate.
  2. Bracts large, orbicular, persistent, leaf-like, enclosing and concealing the flowers.......... 1. *D. pulchellum*
  2. Bracts very small or none.
    3. Flowers umbellate, umbels arranged in terminal or axillary panicles; erect shrubs.......... 2. *D. quinquepetalum*
    3. Flowers not umbellate; herbs or undershrubs.
      4. Pods not sinuate, the segments much longer than broad. 3. *D. scorpiurus*
      4. Pods deeply sinuate, spirally twisted, the segments as broad as long.......... 4. *D. procumbens*
      4. Pods not deeply sinuate nor spirally twisted.
        5. Prostrate or spreading, suffrutescent; leaves silvery-pubescent beneath; flowers numerous.......... 5. *D. capitatum*
        5. Slender spreading herbs with 1 to 3 flowers in the leaf-axils.
          6. Pedicels usually shorter than the petioles; leaflets obovate-cuneate, truncate or emarginate; branches nearly glabrous. 6. *D. triflorum*
          6. Pedicels longer than the petioles; leaflets usually oblong, rounded at the apex; branches pubescent with spreading hairs.......... 7. *D. heterophylla*
1. Leaves 1-foliolate.

- 2. Petioles broadly winged .... 8. *D triquetrum*
- 2. Petioles not winged.
  - 3. Leaflet ovate to oblong-ovate, narrowed to the acute or acuminate apex.
    - 4. Petioles less than 5 mm long; racemes rather dense; pods pubescent .... 9. *D. virgatum*
    - 4. Petioles 1 to 2.5 cm long; flowers laxly disposed; leaves gray-pubescent beneath; pods nearly glabrous .... 10. *D. gangeticum*
  - 3. Leaflet órbicular-ovate to orbicular, obtuse or rounded. 11. *D. lasiocarpum*

1. D. PUCHELLUM (L.) Benth. Payang-payang (Tag.).

An erect undershrub 0.5 to 1.5 m high. Leaves 3-foliolate; leaflets finely pubescent beneath, the terminal one oblong, 8 to 13 cm long, more than twice as large as the two lateral ones. Inflorescence terminal and axillary, 8 to 25 cm long, the flowers umbellate or fascicled, hidden by the distichous, orbicular bracts which are 1 to 1.5 cm in diameter. Flowers white, about 6 mm long. Pods oblong, pubescent, usually of 2, rarely of 1 or 3 joints.

In open dry grass lands and thickets, fl. Oct.–Jan.; widely distributed in the Philippines, probably introduced. Tropical Asia to the Mascarene Islands, Malaya, New Guinea, and Polynesia.

2. D. quinquepetalum (Blanco) Merr. Payispis, Baquisquis (Tag.).

An erect branched shrub or small tree 2 to 7 m high, nearly glabrous or somewhat pubescent. Leaves 3-foliolate; leaflets oblong-ovate to lanceolate-ovate, sharply acuminate, prominently nerved, 3 to 9 cm long. Inflorescence paniculate, terminal and axillary, 10 to 35 cm long, pubescent, the flowers in racemosely arranged 2- to 7-flowered umbels. Flowers white, fragrant, 1.5 cm long, very numerous. Pods oblong, curved, consisting of from 3 to 6 joints.

In thickets Masambong, Fort McKinley, etc., fl. Sept.–Nov.; widely distributed in Luzon. Endemic.

3. D. SCORPIURUS (Sw.) Desv.

A prostrate or ascending, slender, often widely spreading, somewhat hirsute annual. Leaves 3-foliolate, the leaflets elliptic to oblong-elliptic, rounded, 1.5 to 3.5 cm long, the terminal one larger than the lateral ones. Racemes terminal, slender, distantly few-flowered. Flowers pale-purplish, about 4 mm long. Pods slender, green, 2 to 5 cm long, less than 2 mm wide, pubescent, of from 3 to 8 joints, which are much longer than wide, scarcely constricted between the joints.

In open dry places, old walls, cliffs, etc., fl. all the year; widely distributed in the Philippines. A native of tropical America; introduced and naturalized here and in Polynesia, but not reported from any other part of the Orient.

4. D. PROCUMBENS (Mill.) A. S. Hitchc. (*D. spirale* DC.).

An erect, nearly or quite glabrous, slender, annual herb 0.5 to 1.5 m high. Leaves petioled, 3-foliolate; leaflets ovate-oblong to lanceolate, obtuse, 1 to 6 cm long, the terminal one longer than the lateral ones. Racemes axillary and terminal, lax, slender, 8 to 20 cm long. Flowers usually in scattered pairs, yellowish-green, about 2.5 mm long, their pedicels long and slender. Pod 1 cm long or less, slender, 4 to 6-jointed, spirally twisted, the joints about as long as broad.

In thickets, open waste lands, etc., San Pedro Macati, Tondo, etc., fl. Sept.–May; local in the Philippines and certainly introduced; undoubtedly a native of tropical America, now in many tropical countries.

5. **D. capitatum** (Burm.) DC. Manimani, Manimanihan (Tag.).

A somewhat woody plant, the branches prostrate and spreading or somewhat ascending, up to 1 m in length, all parts more or less white-pubescent, at least when young. Leaves 3-foliolate; leaflets broadly obovate, base wedge-shaped, apex rounded, truncate or retuse, 1.5 to 4 cm long, silky-pubescent with white hairs beneath. Racemes numerous, axillary and terminal, dense, many-flowered, 2 to 5 cm long. Flowers pale-purple, about 6 mm long. Pods numerous, 1 to 2 cm long, veined, somewhat pubescent, consisting of from 3 to 6 joints.

In open grass lands Caloocan to Fort McKinley, fl. Nov.–Jan.; widely distributed in the Philippines, possibly introduced. India to Malaya.

6. D. TRIFLORUM (L.) DC.

A slender, prostrate, branched, somewhat hairy herb, the stems 10 to 30 cm long. Leaves 3-foliolate, small, the stipules brown, acuminate. Leaflets oblong-elliptic to obovate, usually retuse, 7 to 15 mm long. Flowers purplish, about 6 mm long, axillary, solitary or 2 or 3 together, the pedicels slender, about 1 cm long. Pod 5 to 12 mm long, of 2 to 6 joints.

In open dry grass lands, lawns, waste places, etc., common, fl. most of the year; throughout the Philippines, undoubtedly introduced. Cosmopolitan in the tropics.

7. D. HETEROPHYLLUM (Willd.) DC.

A prostrate, spreading, slender plant, the stems clothed with long, spreading hairs, branched, 10 to 40 cm long. Leaves 3-foliolate; leaflets oblong, elliptic, or obovate-oblong, apex rounded, 1 to 2 cm long, hairy beneath. Pedicels axillary, slender, much longer than the petioles, 1- or few-flowered. Flowers purple, 5 to 6 mm long. Pods about 1.5 cm long, of 4 or 5 joints, the joints as broad as long, the upper suture continuous, the lower indented.

In open grass lands Santa Mesa, Masambong, etc., fl. Oct.–Jan.; of very local occurrence in the Philippines, undoubtedly introduced. India to the Mascarene Islands, China, and Malaya.

8. D. TRIQUETRUM (L.) DC.

An erect, branched, suffrutescent herb or a shrub 1 to 2 m high. Leaves simple, oblong to lanceolate, acuminate, 10 to 25 cm long; petiole 2 to 3 cm long, prominently winged. Racemes terminal and axillary, up to 30 cm in length. Flowers numerous, purplish, about 5 mm long. Pods 2 to 5 cm long, the joints 6 to 8, nearly square.

Cementerio del Norte, fl. Oct.–Dec.; of local occurrence in the Philippines. India to the Mascarene Islands, China, Malaya, and northern Australia.

9. **D. virgatum** Zoll.

A slender, erect, simple or somewhat branched undershrub less than 1 m high, more or less pubescent. Leaves simple, ovate to oblong-ovate, acute to acuminate, 7 to 14 cm long, appressed-pubescent beneath, the petioles short, pubescent, about 6 mm long. Racemes terminal and axillary, erect, many-flowered, slender, 6 to 20 cm long. Flowers white, usually tinged with pink, 4 to 5 mm long. Pod pubescent, slightly curved or falcate, 1 to nearly 2 cm long, consisting of from 3 to 7 joints. (Fl. Filip. *pl. 337*, *D. gangeticum.*)

In thickets, Masambong, fl. Nov.–Jan.; of local occurrence in Luzon and Palawan. Burma, the Malay Peninsula, and Java.

10. D. GANGETICUM (L.) DC.

An erect or ascending, suffrutescent, somewhat branched plant usually about 1 m high, the stems slender, somewhat angular and grayish-pubescent. Leaves simple, the petiole 1.5 to 2 cm long, the blades oblong-ovate, acute, base rounded, grayish-pubescent beneath, 6 to 13 cm long, 3.5 to 7 cm wide. Racemes lateral and terminal, ascending, slender, up to 30 cm long. Flowers numerous pale-greenish, about 4 mm long. Pods numerous, somewhat curved, crowded, 1.5 to 3 cm long, about 3 mm wide, consisting of from 4 to 10 joints, pubescent.

In open, rather dry lands, San Pedro Macati, etc., fl. most of the year; widely distributed in the Philippines, undoubtedly introduced. Tropical Africa, and Asia, extending to Australia and Polynesia.

11. D. LASIOCARPUM (Beauv.) DC. (*D. latifolium* DC.).

An erect, somewhat branched, suffrutescent herb or undershrub 1 m high or less, densely and softly pubescent. Leaves simple, rarely 3-foliolate with a pair of much reduced lateral leaflets, coriaceous, broadly ovate, rounded or obtuse, base broadly rounded or subcordate, 4 to 8 cm long. Racemes axillary and terminal, erect, solitary, densely many-flowered, 5 to 10 cm long. Flowers pink-purple, 4 to 5 mm long. Pods 1.5 to 2 cm long, linear, about 5-jointed, slightly curved, densely covered with spreading, hooked hairs.

In open dry places near Fort McKinley, fl. Nov.–Dec.; widely distributed in the Philippines, probably introduced. Tropical Africa, Asia, and Malaya; introduced in the West Indies.

24. ALYSICARPUS Necker

Erect or spreading, branched, annual herbs. Leaves simple, stipellate, suborbicular to linear. Flowers small, in axillary or terminal racemes. Calyx deeply toothed, the upper 2 teeth often connate. Corolla not exserted; standard broad; keel obtuse, adhering to the wings. Stamens diadelphous. Ovary sessile or subsessile, many-ovuled. Pod cylindric or turgid, composed of several, indehiscent, 1-seeded joints. (Greek "chain" and "fruit," in allusion to the jointed pods.)

Species about 15 in the tropics of the Old World, 3 in the Philippines, possibly all introduced.

1. Leaves linear to lanceolate-linear; pods smooth; calyx equaling several joints of the pod.. 1. *A. bupleurifolius*
1. Leaves suborbicular to oblong or oblong-lanceolate; calyx as long as the first or the first two joints of the pod.
    2. Erect or suberect often 1 m high; pods quite glabrous.. 2. *A. vaginalis*
    2. Prostrate or spreading; pods pubescent.............. 3. *A. nummularifolius*

1. A. buplurifolius (L.) DC.

An erect, slender, branched, somewhat wiry herb 25 to 50 cm high. Leaves linear to linear-lanceolate, 2 to 5 cm long; stipules lanceolate-acuminate, brown, 8 mm long or less. Racemes terminal, slender, interrupted, 10 to 15 cm long, the flowers in pairs, 6 mm long, the pedicels very short. Calyx teeth twice as long as the tube. Pods 1 cm long or less, composed of 4 to 6, glabrous, smooth joints.

In open grass lands, San Pedro Macati, common, fl. Oct.–Feb.; of local occurrence in the Philippines. India to China, Malaya, and Polynesia.

2. **A. vaginalis** (L.) DC.

An erect or ascending, branched herb reaching a length of 1 to 1.5 m, sparingly pubescent and hirsute. Leaves elliptic, retuse or rounded, 1.5 to 5 cm long. Flowers as in the next species. Pods cylindric, glabrous, rugose, 1.5 to 2 cm long, composed of from 4 to 7 joints.

In open grass lands near Fort McKinley, fl. Aug.–Feb.; of local occurrence in the Philippines. Range of the next species to which it is very closely allied, differing in its much larger size and glabrous pods.

3. **A. nummularifolius** (L.) DC. Malacalisquis, Banig-usa, Manimanihan (Tag.).

A usually spreading or prostrate, rarely ascending, branched, nearly glabrous herb, the stems sometimes nearly 1 m long, often much shorter, the branchlets pubescent. Leaves exceedingly variable, elliptic to oblong or lanceolate, obtuse, rounded, or acute, 1 to 4 cm long, 0.5 to 1.5 cm wide. Racemes terminal, 2 to 3 cm long. Flowers pink-purple, 6 mm long, usually rather densely arranged. Pods mostly crowded, 1 to 2 cm long, 2.5 mm thick, composed of from 3 to 6, somewhat rugose, pubescent joints.

In open waste places, grass lands, etc. common, fl. more or less all the year; throughout the Philippines. Tropics of the Old World; introduced in America.

25. URARIA Desvaux

Herbaceous or suffrutescent perennial herbs, erect or spreading. Leaves 1- to 3-foliolate, leaflets stipellate. Flowers numerous, small, in dense cylindric or spike-like racemes. Calyx-tube short, the upper 2 teeth short, the lower 3 usually elongated, setaceous. Standard broad; wings adhering to the keel. Stamens diadelphous; anthers uniform. Ovary few-ovuled; style slender, inflexed. Pod small, of 2 to 6, swollen, 1-seeded, indehiscent joints. (Greek "tail.")

Species 8, India to China, southward to Australia, 2 in the Philippines.

1. **U. lagopodioides** (L.) Don.

A pubescent, spreading or trailing plant, the stems branched, up to 60 cm in length, the flowering branches erect or ascending. Leaves 1- and 3-foliolate, often intermixed, the stipules linear or setaceous; leaflets orbicular to elliptic or elliptic-lanceolate, rounded or subacute, apiculate, 1 to 6 cm long. Inflorescence terminal, the flowers pale-purple, in very dense, cylindric, ovoid to oblong, pubescent racemes, 3 to 8 cm long, usually about 2 cm thick, the bracts ciliate, ovate to lanceolate, long-acuminate, 8 to 12 mm long. Lower calyx-teeth elongate, ciliate, the pedicels densely ciliate. Corolla about 6 mm long. Pod with 1 or 2 ellipsoid, swollen, shining, 3 mm long joints.

In open dry grass lands, Masambong, San Pedro Macati, etc., fl. Apr.–Dec.; widely distributed in the Philippines. India to China, southward to Australia and Polynesia.

26. LOUREA Necker

Erect or spreading herbs with thin, stipellate, 1- to 3-foliolate leaves. Flowers in terminal, simple or panicled racemes. Calyx thin, campanulate, enlarged in fruit, the teeth lanceolate, as long as the tube. Corolla equaling or longer than the calyx; standard broad; keel obtuse. Stamens diadelphous. Ovary few-ovuled; style inflexed, slender. Pod of few, small, distinct, 1-seeded, smooth, veined joints, included in the calyx.

Species 4, India to China, Malaya, and Australia, 2 in the Philippines, the following introduced.

* 1. L. VESPERTILIONIS (L.) Desv.

Erect, slender, about 60 cm high, the upper parts finely pubescent. Leaves with 1, rarely 3 leaflets, green, mottled or clowded with white, the end one several times broader than long, 4 to 7 cm wide, usually less than 1 cm long, the halves linear to lanceolate, spreading, apex broadly marginate. Racemes slender 3 to 12 cm long. Flowers small. Calyx in fruit about 1 cm long. Pod of 4 or 5 joints. (Fl. Filip. *pl. 201.*)

Occasionally cultivated in Singalon for ornamental purposes. A native of India, now widely distributed in the tropics, wild or cultivated.

27. INDIGOFERA Linnaeus

Erect branched herbs, shrubs, or small trees, more or less pubescent. Leaves pinnate, sometimes simple or 3-foliolate. Flowers small, in many-flowered, axillary racemes. Calyx small, campanulate, 5-toothed, the teeth subequal or the lowest one longest. Standard obovate, the keel straight, spurred on each side near the base. Stamens diadelphous. Ovary few- to many-ovuled; style short; stigma capitate, usually penicillate. Pod usually linear-cylindric, often curved. (So named because some species yield indigo.)

Species about 300 in all tropical regions, 8 in the Philippines.

1. Pods densely hirsute with spreading hairs; densely pubescent plants. 1. *I. hirsuta*
1. Pods glabrous or nearly so, not hirsute; nearly glabrous plants.
    2. Pods much curved, 1 to 1.5 cm long, 6- to 8-seeded.... 2. *I. suffruticosa*
    2. Pods straight or curved only at the apex, 2 to 3 cm long, 8- to 12-seeded. 3. *I. tinctoria*

1. I. HIRSUTA L. Tayom-tayoman (Tag.).

An erect, branched, annual, suffrutescent herb 0.4 to 1 m high, the stems reddish-brown, covered with spreading brown or purplish hairs. Leaves 8 to 15 cm long, the stipules linear, hirsute, 1 cm long; leaflets 5 to 11, obovate, pubescent, pale, beneath, 1.5 to 3 cm long. Racemes axillary, dense, 6 to 20 cm long, hirsute. Flowers about 6 mm long, the calyx hirsute, the corolla reddish-purple, slightly exserted. Pods straight, reflexed, 1.5 to 2.5 cm long, about 2.5 mm wide, covered with brown, spreading hairs.

In open grass lands, waste places, etc. fl. most of the year; widely distributed in the Philippines, but surely introduced here. Tropics generally.

2. I. SUFFRUTICOSA Mill. (*I. anil* L.). Tayom (Tag.); Indigo.

An erect, branched, suffrutescent plant 1 m high or less, slightly pubescent with short, appressed hairs. Leaves 5 to 8 cm long; leaflets 9 to 11, oblong to elliptic-oblong, apiculate, 1 to 2 cm long, pale and appressed-pubescent beneath. Racemes axillary, solitary, 2 to 3 cm long. Flowers red, about 5 mm long, corolla long-exserted. Pods numerous, crowded, reflexed, strongly curved, 1 to 1.5 cm long, 6- to 8-seeded, slightly appressed-pubescent with very short hairs.

In open waste places, San Pedro Macati, etc., fl. most of the year; widely distributed in the Philippines. A native of tropical America, now found in many other tropical countries.

3. I. TINCTORIA L. Tayom (Tag.); Indigo.

An erect, slightly pubescent shrub, 1 to 1.5 m high. Leaves 6 to 10 cm long; leaflets 9 to 13, obovate-oblong, 1.5 to 2.5 cm long. Racemes rather lax, sessile, 2 to 6 cm long. Flowers reddish or reddish-yelow, small. Pods spreading or reflexed, straight or nearly so, 2 to 3 cm long, 8- to 12-seeded. (Fl. Filip. *pl. 163.*)

In thickets and waste places, Pasig, fl. Aug.–Dec. and probably in other months; widely distributed in the Philippines but certainly introduced. Formerly, like the preceding species, extensively cultivated for indigo. Tropics generally.

27. TEPHROSIA Persoon

Herbs or undershrubs, erect or spreading, with odd-pinnate leaves, the leaflets opposite, usually pubescent. Racemes leaf-opposed. Flowers usually small, numerous. Calyx-tube campanulate, the teeth subequal. Petals clawed; standard suborbicular; keel incurved. Stamens diadelphous; anthers obtuse. Ovary linear, many-ovuled; style incurved; stigma capitate, often penicillate. Pod linear, flat, 2-valved, many-seeded. (Greek "ash-colored," from the gray pubescence of many species.)

Species about 100 in the tropics of both hemispheres, 4 in the Philippines.

1. T. dichotoma Desv. Balabalatungan (Tag.).

An erect or ascending, branched, shrubby or suffrutescent plant 1 m high or less, all parts pubescent. Leaves 5 to 10 cm long, odd-pinnate; leaflets 5 to 21, narrowly oblong-oblanceolate, mucronate, base cuneate, 1 to 2.7 cm long, the lower surface pubescent with appressed pale hairs. Racemes short, dense, axillary, many-flowered. Flowers pink-purple, about 7 mm long. Pods many, straight or slightly curved, narrowly oblong, pubescent, 2.5 to 3.5 cm long, about 4 mm wide, containing 7 to 12 seeds. (Fl. Filip. *pl. 162, T. luzoniensis.*)

In open waste places, occasional, fl. most of the year; widely distributed in Luzon. Endemic.

29. MILLETTIA Wight & Arnott

Trees or shrubs, sometimes climbing. Leaves odd-pinnate. Flowers showy, in axillary, simple, often fascicled racemes or in terminal panicles. Calyx campanulate, truncate or with short teeth. Corolla exserted, the petals clawed; standard broad; keel not beaked. Stamens monadelphous or diadelphous. Ovary linear, few-ovuled; style incurved; stigma capitate. Pod linear to oblong, usually flat, few-seeded, indehiscent or tardily so. (In honor of Doctor Millet, an English physician.)

Species 60 or more in the tropics of the Old World, 6 or more in the Philippines.

1. **M. merrillii** Perk.

A glabrous shrub or small tree reaching a height of 8 to 10 m. Leaves 15 to 22 cm long. Leaflets ovate to oblong-ovate, acuminate, 4 to 8 cm long. Racemes axillary, about as long as the leaves. Flowers pink to purple, about 12 mm long, the calyx cup-shaped, truncate. Pod oblong to oblong-oblanceolate, flat, 9 to 13 cm long, about 1 cm wide, acuminate. (Fl. Filip. *pl. 79, M. xylocarpa.*)

In thickets, Masambong, near San Pedro Macati, etc., fl. Feb.–Apr.; of local occurrence in the Philippines. Endemic.

30. GLIRICIDIA Humbolt, Bonpland, & Kunth

Trees with odd-pinnate leaves, the leaflets entire, often mottled when dry, not stipellate. Flowers in axillary racemes, often from the branches below the leaves. Calyx-teeth short, the upper 2 subconnate. Standard broad, reflexed; wings falcate-oblong, free; keel incurved, obtuse. Vexillary stamen free, the others united in a sheath. Ovary many-ovuled. Pods stipitate, flat, 2-valved, the valves coriaceous.

Species 3 or 4 in tropical America, 1 introduced in the Philippines at an early date and now widely distributed here.

1. G. SEPIUM (Jacq.) Steud. (*G. maculata* HBK.). Madre cacao; Cacauate (Sp.-Fil.).

A glabrous deciduous tree 3 to 10 m high. Leaves 15 to 25 cm long; leaflets about 13, opposite, oblong-ovate, slightly acuminate, blunt, base usually rounded, 4 to 6 cm long, rather pale beneath, green and shining on the upper surface. Racemes numerous on the leafless branches, densely many-flowered, solitary in the axils of fallen leaves, 4 to 8 cm long. Flowers 2 cm long, pink, the calyx truncate. Standard reflexed, retuse, pale-yellow in the median part. Pods narrowly oblong to oblanceolate, 10 to 14 cm long, about 2 cm wide, flat, 6- to 8-seeded, tardily dehiscent. (Fl. Filip. *pl. 250, Galedupa pungam.*)

In thickets, hedge rows, etc., very common, fl. Dec.–Apr.; throughout the Philippines in and about towns. A native of Mexico, introduced here at early date and thoroughly naturalized; not reported from any other part of the Orient.

31. CLITOREA Linnaeus

Scandent, somewhat woody vines with showy white or blue flowers and pinnately 5- to 7-foliolate leaves, the leaflets stipellate. Flowers solitary, axillary, the peduncles with 2 small bracts and 2 large bracteoles. Calyx thin, tubular, 5-lobed. Corolla exserted, the standard shaped like the bowl of a spoon, very much larger than the wings and incurved keel. Stamens monadelphous or diadelphous; anthers uniform. Ovary stalked, many-ovuled. Pod linear, flattened.

Species about 30, mostly in the tropics of the New World, one in the Philippines.

1. C. TERNATEA L.

A scandent vine, the stems sometimes 1 cm in diameter. Leaflets 5 to 7, elliptic to oblong, obtuse, 3 to 7 cm long, the stipels small, acicular. Flowers solitary, the bracts oblong, about 2 mm long, the bracteoles green, roundish, 5 to 8 mm long. Calyx green, 1.5 cm long. Corolla 3.5 to 4 cm long, the standard deep-blue with a white or yellowish center, pale-blue, or nearly white. Pod 5 to 10 cm long, flat, 6- to 10-seeded. (Fl. Filip. *pl. 301.*)

Quite common in thickets, often cultivated; throughout the Philippines, but certainly introduced. Cosmopolitan in the tropics.

32. PAROSELA Cavanilles

Erect, branched, glandular-punctate herbs with alternate, odd-pinnate leaves, the leaflets small, numerous. Flowers blue or purplish, in dense, terminal, peduncled, or subsessile, head-like spikes. Calyx-teeth subequal. Standard broad, clawed, base of the limb cordate or auricled; wings and keel usually longer than the standard, their claws usually adnate to the staminal tube. Stamens 10 or 9, monadelphous. Pods membranaceous, included in the calyx, usually 1-seeded and indehiscent. (Anagram of *Psoralea*, an allied genus.)

Species 100 or more mostly in North America, few in South America, 1 Mexican species introduced and thoroughly naturalized here.

1. P. **GLANDULOSA** (Blanco) Merr. (*Psoralia nigra* Mart. & Gal.). Dura (Tag.).

An erect, branched, nearly or quite glabrous herb 30 to 60 cm high, the stems reddish or purplish. Leaves about 3 cm long; leaflets linear to narrowly oblong, obtuse, 4 to 10 mm long, prominently glandular-punctate beneath. Spikes dense, capitate ovoid to oblong, 1 to 2 cm long. Flowers very numerous, each substended by a lanceolate, long-acuminate, pubescent, glandular, 6 to 7 mm long bract. Calyx greenish, hirsute. Corolla, including the slender white tube, about 7 mm long, the limb blue, exserted. Pod small, pubescent.

Very common in open dry lands, San Pedro Macati, etc., fl. Sept.–Feb.; locally common in Luzon. A native of Mexico thoroughly naturalized here, but not reported from any other part of the Orient.

33. PTEROCARPUS Linnaeus

Trees with odd-pinnate leaves, the leaflets ovate, entire, alternate. Flowers yellow, in axillary panicled racemes, the pedicels jointed at the apex. Calyx turbinate, curved in bud, the teeth short. Petals exserted, long-clawed, the standard and wings crisped. Staminal sheath slit above and below or only above, the upper stamen often nearly or quite free. Ovary 2-ovuled; style incurved. Pod orbicular, usually 1-seeded, indehiscent, surrounded by a broad wing. (Greek "wing" and "fruit.")

Species 15 or more, cosmopolitan in the tropics, 3 in the Philippines.

Pods smooth	1. *P. indicus*
Pods covered with slender spreading spines	2. *P. echinatus*

1. **P. indicus** Willd. Narra (Tag.); Naga (Vis.).

A tree reaching a height of 25 m or more. Leaves 15 to 30 cm long; leaflets 7 to 11, ovate to oblong-ovate, blunt-acuminate, 5 to 10 cm long, alternate, shining. Panicles axillary, branched. Flowers numerous, yellow, about 1.5 cm long. Young pods pubescent, glabrous or nearly so when mature, orbicular to obovate, including the wing 4 to 5.5 cm long; the wing 1 to 1.5 cm wide, more or less reticulate and undulate, very shortly beaked. (Fl. Filip *pl. 205.*)

A single tree in the old Botanical Garden, fl. Apr.–May; widely distributed in the Philippines. India to China, Malaya, and Polynesia.

2. **P. echinatus** Pers. Narra (Tag.); Naga (Vis.).

Very similar to the preceding, differing in that part of the pod opposite the seeds being covered with slender, spreading, straight spines.

A few trees in Singalon, fl. June–July; widely distributed in the Philippines. Celebes.

34. DALBERGIA Linnaeus fils

Climbing shrubs or erect trees. Leaves odd-pinnate; leaflets alternate. Flowers small, numerous, in terminal or axillary panicles. Calyx campanulate, with 5 short teeth. Corolla exserted; standard broad; keel obtuse, its petals joined at the tip. Stamens 9 or 10, monadelphous, or the sheath slit down one side. Ovary stalked, few-ovuled; style short, curved, glabrous. Pod oblong or strap-shaped, usually thin and flat, 1- to 4-seeded, indehiscent, sutures not winged. (In honor of N. Dalberg, a Danish physician.)

A large genus of wide distribution in the tropics, 6 or 7 in the Philippines.

1. **D. ferruginea** Roxb.

A climbing shrub reaching a height of several meters, the younger parts brown-pubescent, often becoming nearly glabrous when old. Leaves 10 to 20 cm long; leaflets 15 to 21, elliptic-oblong or oblong, apex rounded or retuse, base slightly oblique, 1.5 to 4 cm long. Panicles axillary and terminal, forming a leafy inflorescence. Flowers pink, white, or yellowish, about 5 to 7 mm long. Pods 3 to 7 cm long, 1.5 cm wide or less, 1- to 3-seeded, stalked, oblong to strap-shaped, the parts opposite the seeds thickened, the other parts thin.

In thickets, Masambong, fl. March–June; widely distributed in the Philippines. Borneo to New Guinea and the Caroline Islands.

35. PONGAMIA Ventenant

Glabrous trees with odd-pinnate leaves, the flowers in axillary racemes. Calyx campanulate or cup-shaped, truncate or subtruncate. Corolla exserted, the standard broad, the keel obtuse. Stamens monadelphous, the upper filaments free nearly to the base. Ovary 2-ovuled; style incurved. Pod woody, flattened, oblong, indehiscent, not winged or thickened along the margins. (From its Indian name.)

A single variable species.

1. **P. mitis** (L.) Merr. (*P. glabra* Vent.). Balic-balic (Tag.).

A tree 8 to 25 m high, glabrous throughout. Leaves 20 to 25 cm long; leaflets 5 to 7, ovate to oblong-ovate, acuminate, 6 to 15 cm long, the terminal one larger than the others. Racemes in the upper axils, 15 to 20 cm long. Flowers numerous, purplish, pink or nearly white, about 1.5 cm long. Pod woody, glabrous, oblong, 5 to 7 cm long, 5 to 8 mm thick, shortly beaked at the apex. (Fl. Filip. *pl. 417.*)

Along tidal streams and near the sea, fl. Oct., and probably in other months; throughout the Philippines in similar habitats. India to the Seychelles, Malaya, Australia, and Polynesia.

36. DERRIS Loureiro

Scandent or more rarely erect shrubs or small trees. Leaves odd-pinnate, the leaflets not stipellate. Inflorescence of axillary and terminal racemes or panicles. Calyx nearly truncate. Corolla much exserted. Stamens usually monadelphous or the upper one free. Ovary sessile, few-ovuled.

Pods rather rigid, flat, indehiscent, oblong or strap-shaped, with a distinct wing down one or both sutures. (Greek "membrane" from the thin pods of some species.)

Species about 40, in most tropical countries, about 12 in the Philippines.

1. Vexillary filament free throughout; flowers solitary on the nodes of the inflorescence.. 1. *D. diadelpha*
1. Vexillary filament more or less united with the others; flowers fascicled on the usually thickened nodes of the inflorescence.
    2. Leaflets 9 to 13; pods 4 to 6 cm long, about 1 cm wide.... 2. *D. scandens*
    2. Leaflets 3 to 7; pods 2.5 to 5 cm long, 2 to 3 cm wide.... 3. *D. trifoliata*

1. **D. diadelpha** (Blanco) Merr. (*D. sinuata* Thwaites). Tibalao, Bagarilao (Tag.).

A scandent shrub 2 to 8 m high. Leaves 15 to 30 cm long; leaflets large, 7 to 11, oblong to oblong-ovate, broadly acuminate, 6 to 15 cm long. Panicles about as long as the leaves, pubescent. Flowers numerous, white, about 1.5 cm long, the calyx pubescent. Vexillary filament entirely free from the others. Pods 4 to 12 cm long, about 2 cm wide, rather hard, narrowly winged down one suture, containing from 1 to 4 seeds. (Fl. Filip. *pl. 336, D. floribunda.*)

In thickets near Caloocan, occasional, fl. Apr.–June; widely distributed in the Philippines. Ceylon and India to Indo-China and Malaya.

2. **D. scandens** (Roxb.) Benth.

A scandent shrub 3 to 6 m high, somewhat ferruginous-pubescent or nearly glabrous. Leaves odd-pinnate, about 15 cm long. Leaflets 9 to 13, oblong-ovate to elliptic-lanceolate, 2 to 6 cm long, 1 to 2.5 cm wide, apex broadly acuminate, usually retuse. Racemes axillary, few- to many-flowered, longer than the leaves, the flowers usually fasciculate on the very short lateral branches. Calyx dull-purple, somewhat oblique, 3 mm long. Corolla white, about 1 cm long. Pods flattened, lanceolate or oblong-lanceolate, narrowed at both ends, 4 to 6 cm long, about 1 cm wide, with a narrow wing along the dorsal suture, containing from 1 to 3 seeds. (Fl. Filip. *pl. 232, Galedupa frutescens.*)

In thickets, Malate, Malinta, etc., fl. June–Sept.; widely distributed in the Philippines. India to China, Malaya, and northern Australia.

3. **D. trifoliata** Lour. (*D. uliginosa* Roxb.).

A scandent glabrous shrub reaching a length of 8 m or less. Leaves 10 to 20 cm long; leaflets shining, oblong-ovate, acuminate, 3 to 7, very variable in size, 4 to 13 cm long. Inflorescence of simple, axillary racemes or narrow panicles, 5 to 10 cm long. Flowers white, often tinged with violet, 8 to 10 mm long. Pods subrhomboid to broadly oblong, 2.5 to 5 cm long, 2 to 3 cm wide, glabrous, 1- or 2-seeded, prominently veined, with a narrow wing along the upper suture. (Fl. Filip. *pl. 161, D. forsteniana.*)

In thickets along the tidal streams, fl. more or less all the year; along the seashore and tidal streams throughout the Philippines. Tropical Africa and Asia, through Malaya to Australia and Polynesia.

37. PISUM Linnaeus

Annual herbs with equally pinnate leaves, ending in a branched tendril, the stipules large, leaf-like. Flowers white, axillary, solitary, pedicelled.

Calyx campanulate, 2-lipped, subequally 5-toothed. Corolla exserted, the standard very broad, the keel shorter than the wings. Stamens diadelphous, the mouth of the tube truncate. Ovary many-ovuled; style thick, compressed. Pods strongly inflated, the valves rather thin. Seeds several, globose. (From the ancient Greek name.)

Species 6 in Europe and Asia, a single cultivated one in the Philippines.

* 1. **P. SATIVUM** L. Chicharo (Sp.); Pea.

An ascending, somewhat glaucous, glabrous, annual plant 0.5 m high or less. Leaves alternate, ending in branched tendrils; leaflets 4 or 6, oblong or elliptic-oblong, blunt or apiculate, 1.5 to 2.5 cm long, the stipules larger than the leaflets, obliquely oblong or ovate, up to 3 cm long, base denticulate, rounded and half-clasping the stem. Flowers white, 1.5 to 2 cm long. Pods inflated, 4 to 8 cm long.

Grown from imported seed for the local market, fl. Dec.–Apr. A native of Europe, now cultivated in all temperate and some tropical countries.

38. ABRUS Linnaeus

Slender, climbing, somewhat woody vines with odd-pinnate leaves. Leaflets small, numerous. Racemes rather dense, peduncled, axillary, many-flowered. Flowers small, pink or purplish. Calyx-teeth short. Standard ovate, below adhering to the staminal-tube; wings narrow; keel arched. Stamens 9, the filaments united in a tube which is slit above, the 10th wanting. Ovary many-ovuled, style short. Pod oblong, flat or turgid; seeds black or black and red. (Greek "elegant," in allusion to the shining red and black seeds.)

Species about 5, cosmopolitan in the tropics, 2 in the Philippines.

Pods oblong, turgid, 2.5 to 5 cm long, 3- to 6-seeded, the seeds red and black. 1. *A. precatorius*

Pod narrowly-oblong, thin, flat, 6 to 8 cm long, 6- to 12-seeded, the seeds black. 2. *A. laevigatus*

1. **A. precatorius** L. Saga, Saga-saga (Tag.).

A slender, scandent, branched, annual vine reaching a length of 9 m or less, sparingly pubescent or nearly glabrous. Leaves 5 to 10 cm long. Leaflets 20 to 40, oblong, mucronate, thin, 1 to 3 cm long. Racemes axillary, usually shorter than the leaves. Flowers numerous, often crowded, pink to pale-purple or salmon, about 1 cm long. Pods oblong, turgid, 2.5 to 5 cm long, about 1.5 cm wide. Seeds 3 to 5, shining, 6 mm long, half black, half scarlet. (Fl. Filip. *pl. 156.*)

In thickets, occasional, fl. Aug.–Apr.; common and widely distributed in the Philippines, possibly introduced. Tropics generally.

2. **A. laevigatus** E. Mey. (*A. pulchellus* Wall.).

A slender twining vine reaching a height of 1.5 to 3 m. Leaves 5 to 10 cm long, the leaflets 8 to 16 pairs, oblong, rounded, apiculate, 1 to 2.5 cm long, slightly pubescent beneath. Flowers numerous, pink, 7 to 8 mm long. Pod thin, flat, smooth, somewhat curved, 6 to 8 cm long. Seeds 6 to 12, black.

In thickets, San Pedro Macati, fl. Oct.–Dec.; widely distributed in the Philippines. India to Africa and Malaya.

39. SESBANIA Scopoli

Erect, branched, suffrutescent herbs, shrubs, or trees. Leaves long, narrow, evenly pinnate, with numerous, oblong or linear-oblong, small, obtuse, mucronate leaflets. Flowers in few-flowered, axillary racemes, small to very large. Calyx campanulate, shallowly 2-lipped or 5-toothed. Corolla much exserted, white or yellow; petals long-clawed; standard broad; keel straight or recurved. Stamens diadelphous. Ovary linear, many-ovuled; style incurved. Pods very long and narrow, septate between the seeds, dehiscent, the seeds very numerous. (From the Arabic name of one species.)

Species about 20 in all tropical countries, 3 in the Philippines.

1. Trees with very large flowers 7 to 8 cm long, white or tinged with pink or red............1. S. *grandiflora*
1. Suffrutescent herbs or shrub-like; flowers small, yellow.
    2. Flowers about 1 cm long, with numerous purplish spots and dashes; pods erect or spreading............2. *S. cannabina*
    2. Flowers about 1.5 cm long, uniformly yellow; pods pendulous. 3. *S. sesban*

1. S. GRANDIFLORA (L.) Pers. Caturay (Tag.); Gauay-gauay (Vis.).

A glabrous tree 5 to 12 m high. Leaves 20 to 30 cm long. Leaflets 20 to 40 pairs, oblong, obtuse, pale-green, 2.5 to 3.5 cm long. Racemes short, axillary. Flowers few, very large, white, 7 to 9 cm long. Calyx green, subtruncate or very shallowly 2-lipped. Pods pendulous, linear, 20 to 60 cm long, 7 to 8 mm wide, somewhat curved, many-seeded. (Fl. Filip. *pl. 291.*)

Not uncommon in cultivation and half-wild, fl. Oct.–Apr.; throughout the Philippines in settled regions and certainly not indigenous, but of prehistoric introduction. India to Mauritius, Malaya, and Australia, often only cultivated.

2. S. CANNABINA (Retz.) Pers. Balacbac (Tag.).

A coarse, erect, branched, suffrutescent, annual herbaceous plant reaching a height of 3 m, with few, scattered, appressed hairs or nearly glabrous. Leaves 20 to 30 cm long, abruptly pinnate, the leaflets 30 to 40, narrowly oblong, obtuse or retuse, apiculate, 1 to 3 cm long, 3 to 5 mm wide. Racemes axillary, 3 to 5 cm long, elongated in fruit, 3- to 6-flowered. Flowers nearly 1.5 cm long, the calyx green, tinged with purple. Petals yellow, the standard with numerous dots and splashes of dark-purple on the back, retuse, reflexed, nearly 1.5 cm wide. Pods pendulous, straight or somewhat curved, 15 to 20 cm long, about 3 mm wide, sharply pointed, containing from 25 to 35 seeds. (Fl. Filip. *pl. 405, S. aegyptiaca.*)

In open, usually rather wet lands, scattered, fl. more or less throughout the year; widely distributed in the Philippines, surely introduced. India to the Malay Peninsula and Java.

3. S. SESBAN (L.) Merr. (*S. aegyptiaca* Pers.).

An erect, branched, stout, shrubby plant 2 to 3 m high, slightly appressed-pubescent. Leaves 10 to 20 cm long; leaflets oblong, rounded, apiculate or mucronate, 2 to 3 cm long, 10 to 20 pairs. Racemes axillary, about 10 cm long, few-flowered above the middle. Flowers uniformly yellow, not spotted with purple, slenderly pedicelled, about 1.5 cm long.

Pods subcylindric or somewhat flattened, slightly twisted, pendulous, about 20 cm long, 3 mm wide, depressed between the seeds.

In waste places, rare, fl. Aug.–Oct.; known in the Philippines only from the vicinity of Manila, introduced. Widely distributed in the tropics.

40. CROTALARIA Linnaeus

Herbs or shrubs, various in habit, with simple or palmately 3- to 7-foliolate leaves. Flowers racemose. Calyx-tube short, the teeth linear or lanceolate. Corolla as long as or exceeding the calyx, the standard usually round, longer than the wings and keel. Stamens diadelphous. Ovary sessile or stalked, ovules few or many; style bearded upward. Pod inflated, sessile or stipitate, straight or curved. (Greek "rattle.")

A very large genus in all tropical and subtropical regions, 15 species in the Philippines.

1. Leaves simple.
  2. Pod about as long as the calyx.. 1. *C. linifolia*
  2. Pod much longer than the calyx.
    3. Flowers yellow; leaves linear to oblong.............................. 2. *C. juncea*
    3. Flowers blue; leaves ovate; stems angular; stipules large, persistent. 3. *C. verrucosa*
1. Leaves 3-foliolate.
    3. Inflorescence terminal; leaflets broad at the apex............ 4. *C. incana*
    3. Inflorescence axillary; leaflets narrowed to the apex.. 5. *C. bracteata*
1. Leaves 5- to 7-foliolate.. 6. *C. quinquefolia*

1. **C. linifolia** L. f.

A slender, erect, simple or branched, annual herb 10 to 80 cm high, pubescent. Leaves linear to narrowly oblong-lanceolate, 1 to 3 cm long, 2 to 5 mm wide. Racemes terminal, elongated, the flowers less than 1 cm long, scattered, yellow. Calyx green, tinged with brown, 2-lipped, the upper lip with 2 short teeth, the lower lip with 3 linear ones. Corolla yellow, the standard 6 to 7 mm wide. Pod glabrous, black, ovoid-oblong, obtuse, about 7 mm long, 4 mm thick, inflated, containing 8 to 10 seeds. (Fl. Filip. *pl. 268, C. stenophylla.*)

Common in open, rather dry grass lands, fl. all the year, but mostly in the rainy season; widely distributed in the Philippines. Tropical Africa, India to China, Malaya, and northern Australia.

2. C. **JUNCEA** L. Sunn Hemp.

An erect, stiff, branched, suffrutescent herb usually about 1 m high, all parts finely pubescent. Leaves simple, linear-oblong to oblong, sessile or shortly petioled, obtuse, 4 to 10 cm long. Racemes terminal, 8 to 20 cm long. Flowers scattered, about 2.5 cm long. Calyx densely brown-pubescent, the lobes long. Corolla yellow. Pods oblong, sessile, brown-pubescent, about 3 cm long.

Singalon, cultivated, fl. Apr.–June. A native of India, of recent introduction in the Philippines and apparently spontaneous in some provinces.

3. C. **VERRUCOSA** L. Bulailaua (Tag.).

An erect, branched, somewhat pubescent or nearly glabrous herb 40 to 80 cm high, the stems angled. Leaves simple, ovate, obtuse, 5 to 11 cm long, base acute, short-petioled, the stipules prominent, leaf-like, semilunate, 5 to 20 cm long. Racemes terminal and lateral. Flowers about 12 mm long, the corolla blue and white. Pods 2.5 to 3.5 cm long, somewhat hairy.

Occasional in open places, Parañaque, fl. Dec.–Apr.; widely distributed in the Philippines, but certainly not an indigenous plant. Most tropical countries.

4. C. INCANA L. Latuc-latucan, Patoc-patocan, Bulailaua (Tag.).

An erect, branched, suffrutescent plant usually about 1 m high, rather softly gray-pubescent, the stems and branches cylindric. Leaflets 3, elliptic to obovate, obtuse or very slightly acuminate, 2 to 5 cm long, 1.5 to 3 cm wide. Racemes terminal, 5 to 20 cm long. Calyx about 1 cm long, the lobes lanceolate, acuminate, much longer than the tube. Corolla yellow, the standard 10 to 13 mm wide. Pods deflexed, inflated, hirsute, 3 to 4 cm long, 1 cm thick or less, containing 20 to 30 seeds. (Fl. Filip. *pl. 160.*)

In waste places, fl. all the year; common about towns throughout the Philippines. A native of tropical America, now widely distributed in the tropics of the world.

5. **C. bracteata** Roxb.

An erect, branched, suffrutescent herb, or somewhat shrubby plant about 1 m high, sparingly pubescent. Leaves 3-foliolate, the leaflets nearly sessile, ovate to oblong-ovate, narrowed at both ends, 5 to 10 cm long. Racemes axillary and terminal, peduncled, 4 to 10 cm long, densely flowered. Flowers yellow, about 1 cm long. Pods oblong-cylindric, densely pubescent.

Near Fort McKinley, fl. Jan.–Feb.; of local occurrence in Luzon. India and the Malay Archipelago.

6. C. QUINQUEFOLIA L. Patocan, Patoc-patocan, Bulailaua (Tag.).

An erect, branched, rather coarse, annual herb 1.5 to 1.3 m high the stems green, striate. Leaflets 5, rarely 7, linear to linear-lanceolate, 4 to 12 cm long, 0.5 to 2 cm wide, pubescent beneath, apex blunt, apiculate. Racemes terminal, the bracteoles narrowly lanceolate, acuminate, 1 to 1.5 cm long. Calyx glabrous, green, about 1 cm long, the lobes ovate or ovate-lanceolate. Petals yellow, the standard more or less brownish-purple on the back, about 2.5 cm wide. Pod inflated, boat-shaped 5 to 6 cm long, about 2 cm wide, stalked, containing 30 to 40 seeds. (Fl. Filip. *pl. 159.*)

In waste-places, old rice-fields, etc., fl. Aug.–Jan.; throughout the Philippines, but certainly introduced. India to Malaya.

41. **FLEMINGIA** Roxburgh

Shrubs or suffrutescent herbs, the leaves digitately 3-foliolate or simple. Flowers racemose, the racemes solitary or panicled, or in small cymes, each cyme hidden by a large folded bract, the bracts distichously arranged in zig-zag racemes. Calyx-tube short, the lobes narrow, acuminate, the lowest one often the longest. Corolla little or not at all exserted, the petals equal in length. Stamens diadelphous. Ovary 2-ovuled. Pod oblong, swollen, small, usually 2-seeded. (In honor of J. Fleming.)

Species about 20, tropical Asia, Africa, Malaya, and Australia, 5 in the Philippines.

Leaves 3-foliolate; flowers in dense, solitary racemes........ 1. *F. cumingiana*
Leaves simple; cymes hidden by large, folded, persistent, distichous bracts, arranged in simple or branched racemes........................ 2. *F. strobilifera*

1. **F. cumingiana** Benth.

An erect or spreading slightly branched, pubescent, shrubby or suffrutescent plant 1 to 2 m high or less. Stems 3-angled, densely pubescent. Leaves 3-foliolate; leaflets ovate to rhomboid-ovate, acute, 5 to 12 cm long, rather densely pubescent beneath, the lateral ones inequilateral. Racemes in the upper axils, dense, pubescent, 2 to 5 cm long. Flowers about 8 mm long. Calyx densely silky-pubescent, as long as the corolla. Standard rather dark-purple, the wings and keel greenish. Pod inflated, about 1 cm long.

In thickets, Pasay, Caloocan to Masambong, etc., fl. Dec.–Feb.; of local occurrence in the Philippines. Endemic.

2. F. STROBILIFERA (L.) R. Br. Payang-payang; Paraparanahan (Tag.).

An erect branched shrub 0.5 to 2 m high, the branchlets velvety, the leaves slightly pubescent or nearly glabrous, ovate to oblong, simple, acute or bluntly acuminate, base rounded or subcordate, 6 to 14 cm long, the nerves ascending. Racemes axillary and terminal, 5 to 15 cm long, composed of numerous, thin, rounded or reniform, folded, imbricated, green bracts which enclose the fascicles or dwarfed cymes of small flowers; bracts very shortly petioled, cordate, 1.5 to 2.5 cm long. Rachis of the racemes zig-zag. Corolla yellowish-green, tinged with purplish, about 8 mm long. Pods oblong, 1 cm long or less, swollen, 2-seeded.

In thickets and open dry places, fl. Dec.–Feb.; widely distributed in the Philippines, undoubtedly introduced. India to China and Malaya; introduced in Mauritius and in the West Indies.

42. MEDICAGO Linnaeus

Erect or trailing herbs with pinnately 3-foliolate leaves, the leaflets toothed. Calyx-tube campanulate, subequally 5-toothed. Corolla exserted, free from the staminal-tube; standard and wings oblong; keel straight, obtuse. Stamens diadelphous; filaments slender. Ovary many-ovuled; style short, slightly incurved; stigma oblique. Pod spirally twisted, many-seeded, indehiscent. (Greek name for alfalfa or lucerne, which came from Media.)

Species about 40, chiefly in the Mediterranean region; 2 introduced in the Philippines.

1. M. DENTICULATA Willd.

An annual, prostrate or spreading, branched, nearly glabrous herb, the stems 20 to 40 cm long. Leaflets obovate-cuneate, 1 to 2 cm long, toothed; stipules laciniate. Peduncles axillary, short, closely 2- to 6-flowered. Flowers yellow, about 5 mm long. Calyx-teeth as long as the tube. Pod with 2 to 4 spirals, the margins pectinate with spreading spines.

A casual plant in recently disturbed soil, adventitious from Europe or America, fl. Apr. and probably in other months. Europe and Asia to Japan; introduced in North America.

43. PUERARIA DeCandolle

Slender or coarse, twining, herbaceous or suffrutescent vines with 3-foliolate leaves, the leaflets stipellate. Flowers small to large, in few- to many-flowered, simple or compound racemes. Calyx-teeth long or short, the upper 2 connate. Corolla exserted; standard as long as the wings and keel. Stamens monadelphous. Ovary many-ovuled. Pod linear, compressed.

Species about 15, India to Japan, southward to Malaya, 4 in the Philippines.

Stipules peltate; pods densely hirsute, about 8 mm wide.
1. *P. thunbergiana*
Stipules not peltate; pods nearly or quite glabrous, less than 5 mm wide.
2. *P. phaseoloides*

1. **P. thunbergiana** (Sieb. & Zucc.) Benth.

A rather coarse, scandent, pubescent, annual, herbaceous vine reaching a length of at least 8 m. Leaflets ovate, acuminate, entire or slightly repand, 10 to 20 cm long, the upper surface glabrous or nearly so, the lower surface rather densely pubescent with soft, grayish hairs. Racemes axillary, 15 to 30 cm long. Flowers about 2 cm long. Calyx pubescent, the lobes acuminate. Corolla rather bright-purple, the standard 2 cm broad, with a rather large yellow spot near the base. Pod 5 to 8 cm long, about 1 cm wide, hirsute with spreading brown hairs.

In thickets, dry hillsides, Pateros, opposite Guadalupe, etc., fl. July–Oct.; local in the Philippines. Japan to China and Formosa.

2. P. PHASEOLOIDES (Roxb.) Benth.

A slender, scandent, hairy, herbaceous vine 2 to 4 m in length, the stipules small, basifixed. Leaflets ovate, irregularly 3-lobed and somewhat sinuate, 6 to 12 cm long, the upper surface green, the lower surface pale, and covered with long, appressed, white hairs. Racemes axillary, solitary, 8 to 25 cm long, or longer. Flowers pale-blue or purplish, about 12 mm long, fasciculate along the rachis, the calyx appressed-hirsute. Pod 5 to 8 cm long, 4 mm wide, slightly appressed-hirsute.

In open grass lands and thickets, fl. all the year; common and widely distributed in the Philippines, undoubtedly introduced. India to China and Malaya.

44. **DUNBARIA** Wight & Arnott

Slender, herbaceous or woody, climbing vines. Leaves 3-foliolate, distinctly gland-dotted on the lower surface, stipels usually wanting. Flowers solitary, axillary, or racemose. Calyx-teeth long and narrow, the lower one longer than the others. Corolla more or less exserted, soon falling or drying up and subpersistent, the keel usually not beaked. Stamens diadelphous, anthers uniform. Ovary sessile or stalked, many-ovuled; style inflexed, glabrous. Pod linear, flat not marked with depressed lines between the seeds. (In honor of Professor Dunbar.)

Species about 15, India to Japan, southward to Australia, 3 in the Philippines.

1. **D. punctata** (W. & A.) Benth. (*D. conspersa* Benth.).

A slender, twining, herbaceous vine, the stems filiform, somewhat pubescent. Leaflets thin, subrhomboid, obtuse, 2 to 3.5 cm long, the lower surface gland-dotted with small, reddish glands. Flowers yellow, axillary, solitary, short-petioled, about 9 mm long, the calyx gland-dotted and pubescent. Pod linear, recurved, 3 to 5 cm long.

In thickets near Fort McKinley, fl. Sept.–Oct.; known in the Philippines only from the vicinity of Manila. India to China southward to northern Australia.

45. CANTHAROSPERMUM Wight & Arnott

Slender twining herbs with 3-foliolate leaves which are gland-dotted beneath. Flowers axillary, solitary or racemed. Calyx-teeth distinct, longer or shorter than the tube. Corolla exserted, the keel not beaked. Stamens diadelphous. Ovary sessile, with 3 or more ovules; style glabrous. Pod oblong, somewhat turgid, marked with transverse lines or depressions between the seeds. (Greek name for a beetle, and "seed" from the scarab-like joints of the pods.)

Species about 25, India to Mauritius and Australia, 2 in the Philippines.

Petals deciduous; leaflets 1.5 to 3 cm long; pods less than 3 cm long. 1. *C. scarabaeoides*

Petals marcescent; leaflets 3 to 9 cm long; pods 5 to 7 cm long.. 2. *C. volubile*

1. **C. scarabaeoides** (L.) Baill. (*Atylosia scarabaeoides* Benth.).

A slender, herbaceous, trailing or twining, more or less pubescent vine reaching a length of 2 m or less. Leaflets obovate-oblong to oblong, obtuse, 1 to 4 cm long, gray-pubescent on both surfaces. Racemes or corymbs short, few-flowered. Flowers yellow, about 1 cm long, the calyx pubescent. Pod oblong, straight, 2 cm long or less, covered with spreading brown hairs, containing 3 to 5 seeds, distinctly depressed between the seeds.

In open grass lands and thickets, San Pedro Macati, Pasay, etc., occasional, fl. Oct.–March; widely distributed in the Philippines, possibly introduced. India to Madagascar, China, Malaya, and the Marianne Islands.

2. **C. volubile** (Blanco) Merr. (*Atylosia crassa* Prain).

A scandent herbaceous vine of indefinite length, more or less pubescent. Leaflets rhomboid-ovate, acuminate, base slightly cordate, the lateral ones somewhat oblique, 3 to 9 cm long. Racemes axillary, few-flowered, 3 to 8 cm long, the bracteoles ovate to oblong-ovate, green, deciduous, up to 2 cm in length. Flowers yellow, about 2 cm long, the calyx-teeth acuminate. Pods oblong, villous, 4 to 5 cm long, about 1.3 cm wide, containing from 4 to 6 seeds.

In thickets, San Juan del Monte, rare, fl. Nov.–Jan.; widely distributed in the Philippines, but not common; India to Indo-China and Malaya.

46. CAJANUS DeCandolle

An erect branched shrub or suffrutescent herb. Leaves 3-foliolate. Flowers racemed. Calyx-tube campanulate, the teeth short. Corolla much exserted, the petals equal in length, the keel truncate. Stamens diadelphous. Ovary few-ovuled; style long, filiform. Pod linear, straight, narrowed at both ends, 3- to 5-seeded, with oblique depressions between the seeds. (From its Malabar name.)

A monotypic genus.

1. **C. CAJAN** (L.) Merr. (*C. indicus* Spreng.). Caguios (Tag.).

An erect, branched, pubescent, shrubby plant 1 to 2 m high. Leaflets 3, oblong-lanceolate to oblanceolate, acuminate, 3 to 10 cm long, grayish beneath when dry. Inflorescence axillary, of few-flowered, corymbose, peduncled racemes, 3 to 7 cm long. Flowers yellow, about 1.5 cm long. Pods 4 to 7 cm long, about 1 cm wide, pubescent, prominently acuminate, obliquely sulcate between the 2 to 7 seeds. (Fl. Filip. *pl. 167.*)

Cultivated for its edible seeds, fl. Dec.–Apr.; widely distributed in the Philippines, cultivated and subspontaneous, but certainly introduced. Tropics of the world, probably a native of India.

47. ERYTHRINA Linnaeus

Trees, usually with prickly branches, the leaves 3-foliolate, the petiolules with prominent glands at their tips. Flowers large, red, in dense racemes. Calyx oblique, spathe-like, finally splitting to the base, or campanulate and 2-lipped. Petals very unequal, the standard longer than the keel and wings. Upper filament free nearly to the base, or more or less connate with others. Ovary many-ovuled; style incurved. Pod linear, swollen, contracted between the seeds or flattened at one end. (Greek "red" in allusion to the large red flowers.)

Species 30 or more, tropics of both hemispheres, 4 in the Philippines.

1. Pods turgid and seed-bearing throughout.
    2. Calyx spathe-like, oblique, splitting to the base down the back; flowers bright-red.. 1. *E. indica*
    2. Calyx campanulate, 2-lipped, not splitting to the base; flowers dull-brownish-red.. 2. *E. fusca*
1. Pods flattened and seedless in the lower one-half........ 3. *E. subumbrans*

1. **E. indica** Lam. Dap-dap (Tag., Vis.).

A diciduous tree reaching a height of 15 m, the branches and branchlets stout, armed with short, few to many, sharp prickles. Leaflets broadly ovate, 8 to 18 cm long, somewhat acuminate, base broad or subrhomboid. Racemes terminal, pubescent, dense, up to 25 cm long. Flowers large, numerous. Calyx about 4 cm long, minutely 5-toothed at the tip, mouth very oblique. Petals bright-red, the standard 7 to 9 cm long, the wings and keel subequal, shorter than the calyx. Pod 10 to 25 cm long, 1.5 to 2 cm in diameter, distinctly constricted between the seeds. (Fl. Filip. *pl. 217.*)

Common, fl. Jan.–Apr., quite or partly leafless at time of flowering; throughout the Philippines, especially near the sea. India, through Malaya to Polynesia.

2. **E. fusca** Lour. (*E. ovalifolia* Roxb.).

A tree reaching a height of 10 m, the trunk with large, conical protuberances, the branchlets and sometimes the petioles with small scattered prickles. Leaflets oblong or elliptic-oblong, 8 to 15 cm long, acute or obtuse, base acute or rounded. Racemes 10 to 20 cm. long. Calyx pubescent, 2-lipped, about 1 cm long. Petals dull-purplish-red, the standard about 4 cm long, rounded or emarginate, the keel about one-half as long, the wings somewhat shorter than the keel. Pods subcylindric, 10 to 25 cm long, about 1.5 mm wide, 6- to 11-seeded, apiculate. (Fl. Filip. *pl. 326.*)

In open wet lands, fl. Jan.–Feb.; widely distributed in the Philippines. India, through Malaya to Polynesia.

3. **E. subumbrans** (Hassk.) Merr. Dap-dap (Tag.).

A tree reaching a height of 15 m, unarmed or with few prickles. Leaflets ovate, acuminate, base rounded or subacute, 7 to 14 cm long. Racemes pubescent, in the upper axils; about 10 cm long. Calyx pubescent, about 8 mm long, 2-lipped. Petals red, the standard about 3 cm long, the keel and wings subequal, less than one-half as long. Pod flat, indehiscent and seedless in the lower one-half, bearing 1 to 3 seeds at the tip, 10 to 12 cm long, with a elongated slender stalk. (Fl. Filip. *pl. 345*, *E. lithosperma.*)

A single specimen in the old botanical garden fl. Oct.–Feb.; widely distributed in the Philippines. Burma to Indo-China and Malaya.

48. TERAMNUS Swartz

Slender, twining, herbaceous vines. Leaves 3-foliolate. Flowers small, in axillary panicled racemes. Calyx campanulate, the teeth distinct. Corolla little exserted, the petals equal in length; standard not spurred. Stamens monadelphous; alternate anthers small, abortive. Ovary many-ovuled; style short. Pods linear, somewhat compressed, septate between the seeds, curved or hooked at the apex.

Species 4, in all tropical countries, 1 in the Philippines.

1. **T. labialis** (L. f.) Spreng.

A slender, twining, more or less pubescent, annual vine reaching a length of 4 m. Leaflets oblong-elliptic to oblong-ovate, obtuse or acute, green and shining on the upper surface, pale and appressed-pubescent beneath, 2.5 to 5 cm long. Inflorescence of axillary, panicled, pubescent racemes 5 to 8 cm long. Flowers 5 mm long. Calyx appressed-pubescent. Corolla purple, only slightly exserted. Pod linear, flat, curved at the apex, slightly pubescent, about 4 cm long, 3 mm wide, containing about 10 seeds.

In thickets, San Pedro Macati, etc., common, fl. Oct.–June; widely distributed in the Philippines, possibly introduced. Cosmopolitan in the tropics.

49. CANAVALIA DeCandolle

Coarse, twining, annual or perennial vines with 3-foliolate leaves, the leaflets stipellate. Flowers rather large. Calyx-limb 2-lipped, the upper lip projecting, entire or emarginate, the lower one shortly 3-toothed. Corolla much exserted, standard large, roundish; wings somewhat shorter, equaling the incurved keel. Stamens monadelphous. Ovary many-ovuled. Pod large, linear, to oblong, flat, sometimes swollen, with a rib on each valve near the upper suture. (From the Malabar name of one species.)

Species about 15, mostly in tropical America, 4 in the Philippines.

1. Pod swollen, 10 cm long or less, about 4.5 cm wide................ 1. *C. turgida*
1. Pod flat, or if swollen then less than 3 cm wide.
  2. Leaflets broad and rounded at the apex; a species growing along sandy seashores.. 2. *C. lineata*
  2. Leaflets acuminate.
    3. Pod less than 20 cm long and 3 cm wide.................... 3. *C. ensiformis*
    3. Pod 25 to 30 cm long, 4 to 5 cm wide.............................. 4. *C. gladiata*

1. **C. turgida** Grah.

A coarse, scandent, herbaceous vine in thickets near the seashore. Leaflets ovate, acuminate, 8 to 15 cm long, base usually rounded. Flowers in pairs at the ends of the scapes, reflexed, about 4 cm long, pink-purple, quite as in the next species. Pods thick, broad, swollen, often nearly flat along the back, 10 to 14 cm long, 5 cm wide, apiculate-acuminate, containing about 6, brown, ellipsoid, somewhat compressed, hard, smooth seeds. (Fl. Filip. *pl. 319, C. virosa.*)

In thickets near the seashore, but not on the sandy beach, Navotas, Pasay, etc., fl. July–March; throughout the Philipppines near the sea. India to Formosa and Malaya.

2. **C. lineata** (Thunb.) DC. Pataning-dagat (Tag.).

A coarse, prostrate, herbaceous vine, growing on the sandy beach, sending up large 3-foliolate leaves and long-peduncled racemes of pink-purple flowers. Petioles 8 to 12 cm long. Leaflets subcoriaceous, broadly obovate-elliptic, 8 to 15 cm long, nearly as wide, the base usually acute, apex broad and rounded or retuse. Scapes erect, 20 to 40 cm high, bearing near the apex few, paired, racemosly arranged flowers about 4 cm long. Calyx 2-lipped, the upper lip large, broadly 2-lobed, the lower one small, subtruncate, 3-toothed. Standard 3 cm wide, retuse. Pod 8 to 12 cm long, 2.3 to 3 cm wide, somewhat turgid when mature.

Pasay beach, fl. Aug.–March; throughout the Philippines along the seashore. Tropics of the world.

3. **C. ensiformis** (L.) DC.

A scandent herbaceous or suffrutescent vine reaching a length of from 2 to 5 m, nearly glabrous, or some parts more or less pubescent. Leaflets narrowly ovate to oblong-ovate, acuminate or acute, base usually rounded, 8 to 16 cm long. Racemes axillary, solitary, up to 40 cm long, flowering only near the apex, only 2 or 3 flowers open at a time. Flowers nearly sessile, reflexed. Calyx green, about 1.5 cm long, the upper lip cleft into 2 broad lobes, the lower reduced to 3 small teeth. Corolla pink, about 3.5 cm long. Pod 14 to 17 cm long, 2 to 2.5 cm wide, flattened, not turgid, 8 to 10 mm thick along the upper suture, containing about 15 seeds.

In thickets, Masambong, fl. Nov.–March; widely distributed in the Philippines, some forms cultivated. Tropics generally, wild and cultivated.

*4. C. GLADIATA (Jacq.) DC. Haba (Sp.-Fil.).

A glabrous vine reaching a length of several meters. Leaflets ovate, somewhat acuminate, 8 to 15 cm long. Racemes axillary, long-peduncled, few-flowered. Flowers white, turning pink, about 3 cm long. Pods large, narrowly-oblong, somewhat curved, 25 to 35 cm long, 4 to 5 cm wide. Seeds red. (Fl. Filipi. *pl. 449.*)

Occasionally cultivated. Not common in the Philippines and only cultivated; undoubtedly native of tropical America, now wild or cultivated in many hot countries.

50. **CENTROSEMA** DeCandolle

Scandent herbaceous vines with 3-foliolate leaves, the stipules persistent, basifixed. Flowers rather large and showy, in axillary racemes, the bracts and bracteoles persistent. Calyx shortly campanulate, the lobes or teeth subequal, or the upper 2 connate. Corolla much exserted. Standard broadly orbicular, longer than the wings. Stamens usually diadelphous. Ovary subsessile, many-ovuled; style somewhat enlarged upward, incurved. Pods linear, the valves longitudinally 2-ribbed. (Greek "spur" and "standard.")

Species about 26, all American, 1 introduced here.

1. C. PLUMIERI (Turp.) Benth.

A twining, herbaceous vine, from a woody base, reaching a length of 5 m or more, glabrous or nearly so. Leaflets ovate, shortly acuminate, 5 to 15 cm long, entire. Racemes axillary, solitary, few-flowered. Flowers 4 to 5 cm long, white, the center magenta. Pods 10 to 15 cm long, about 1 cm wide, long-acuminate, prominently longitudinally 2-ribbed along each valve. (Fl. Filip. *pl. 455, Clitorea plumieri.*)

In thickets near the Balicbalic cemetery; not common in the Philippines and doubtfully spontaneous. A native of South America, introduced and now spontaneous in Malaya.

51. MUCUNA Adanson

Annual or perennial, usually coarse vines. Leaves 3-foliolate, the leaflets ample, stipellate. Flowers racemose, large, showy, dark-purple or pale-greenish. Calyx-tube campanulate, the 2 upper teeth quite connate, the lowest longer than the middle ones. Corolla much exserted; standard not more than one-half as long as the beaked keel, the wings usually a little longer than the keel. Stamens diadelphous; anthers dimorphous. Pod linear to oblong, compressed, smooth or transversely ridged, keeled along the sutures or not, softly pubescent or often covered with very irritating, brown, bristle-like hairs. (A Brazilian name.)

Species 25 or more in all tropical countries, about 10 in the Philippines.

Pods covered with stiff, brown, stinging hairs.......................... 1. *M. pruriens*
Pods velvety-pubescent, no stinging hairs....................................... 2. *M. lyonii*

1. M. pruriens (L.) DC. Lipai, Nipai (Tag.).

A climbing or spreading annual vine reaching a length of several meters, more or less pubescent. Leaves thin, ovate to oblong-ovate, rounded or subacute, apiculate, 5 to 12 cm long, the lateral ones oblique. Racemes pendulous, many-flowered, 10 to 25 cm long, Calyx gray-pubescent and with intermixed, brown, stinging hairs. Corolla dark-purple, almost black, 4 cm long. Pod stout, compressed, slightly curved near the apex, 6 to 11 cm long, 2 cm wide, densely covered with stiff, somewhat appressed, brown, very irritating stinging hairs. (Fl. Filip. *pl. 331*, *M. hirsuta.*)

In thickets etc., occasional near Fort McKinley, fl. Sept.–March; widely distributed in the Philippines. India to Malaya, introduced in tropical America.

***2. M. lyonii** Merr.

A stout, herbaceous, twining vine reaching a length of 4 m or more. Leaflets thin, broadly ovate, the lateral ones oblique, 5 to 18 cm long, slightly hairy beneath. Racemes up to 40 cm in length. Flowers numerous, about 4 cm long, the calyx grayish-pubescent, the corolla dark-purple. Pods 6 to 10 cm long, 1.5 to 1.8 cm wide, the valves with 2 longitudinal ribs, rather velvety-pubescent with short gray hairs, and with no stinging hairs.

Cultivated, Singalon, fl. May–July, and probably in other months; widely distributed in the Philippines in cultivation. This has been reduced to the Indo-Malayan *M. nivea* W. & A., but that species has greenish-white flowers.

52. GALACTIA P. Browne

Slender, twining, herbaceous vines with 3-foliolate leaves, the leaflets stipellate. Flowers racemose, small, the nodes of the inflorescence usually enlarged. Calyx tube short, the teeth narrow, the upper 2 fused in one. Corolla little exserted, the petals nearly equal in length; keel obtuse, nearly straight. Stamens diadelphous. Ovary many-ovuled; style slender. Pod linear, flattened. (From the Greek "milk," some species formerly thought to yield milky sap.)

Species about 45, mostly in tropical America, 1 in the Philippines.

1. G. tenuiflora (Klein) W. & A.

A slender, pubescent, twining, annual vine reaching a length of 2 to 3 m. Leaflets thin, oblong to elliptic-oblong, rounded at the apex, 2 to 3.5

cm long, green and shining above, paler and slightly pubescent beneath. Racemes axillary, solitary, 5 to 8 cm long, slender. Flowers in distant pairs, the nodes slightly or distinctly thickened. Calyx about 6 mm long, pubescent, the teeth longer than the tube. Corolla pink-purple, nearly 1 cm long. Pods flat, thin, sparingly pubescent, 3 to 5 cm long, 5 to 6 mm wide.

In thickets, San Pedro Macati, fl. Oct.–Jan.; not common and very local in the Philippines. India to Malaya and Australia.

53. PHASEOLUS Linnaeus

Twining or erect herbs with 3-foliolate leaves, the leaflets stipellate. Flowers in axillary racemes. Calyx campanulate, the lower tooth usually longer than the others, the upper 2 subconnate. Corolla much exserted, the keel prolonged, spirally twisted. Stamens diadelphous. Ovary many-ovuled; style filiform, twisted with the keel, bearded along one side below the stigma. Pod linear to oblong, compressed or swollen. (The ancient name of the kidney bean.)

Species about 60, chiefly tropical, many cultivated, 7 or 8 in the Philippines.

1. Stipules small, basifixed; flowers usually pink or purple.
  2. Erect herbs with appressed-pubescent narrow pods and dark-purple flowers........ 1. *P. lathyroides*
  2. Twining vines with broader glabrous pods, and greenish-yellow or pale-purple flowers.
    3. Flowers less than 2 cm long.
      4. Pods broad, flat, 1.5 to 2 cm wide; flowers greenish-yellow, less than 1 cm long........ 2. *P. lunatus*
      4. Pods swollen, less than 1.5 wide; flowers 1.5 to 2 cm long, pale-purple or pink and white; cultivated plants........ 3. *P. vulgaris*
    3. Flowers about 2.5 cm long........ 4. *P. adenanthus*
1. Stipules produced below the point of insertion; flowers usually yellow.
  2. Leaflets oblong to lanceolate or linear, usually less than 1 cm wide. 5. *P. minimus*
  2. Leaflets ovate to oblong-ovate, 2 to 3 cm or more in width.
    3. Pods with slightly appressed hairs or glabrous; leaflets often somewhat lobed........ 6. *P. calcaratus*
    3. Pods hirsute with spreading hairs; leaves entire........ 7. *P. radiatus*

1. P. LATHYROIDES L. (*P. semierectus* L.).

An erect, suffrutescent, somewhat branched plant 1 to 1.5 m high, the branches often flexuous, rarely twining, clothed with deflexed hairs. Leaflets oblong to oblong-ovate, 4 to 7 cm long; stipules lanceolate, acuminate, 6 to 8 mm long. Racemes axillary, long-peduncled, the racemes 20 cm long or less, the peduncles as long or longer, the flowers about 2 cm long. Calyx green, 6 to 7 mm long. Standard about 1 cm wide, greenish, the keel and wings dark-purple. Pods reflexed, 8 to 10 cm long, about 4 mm wide, somewhat compressed, appressed pubescent. Seeds numerous, about 3 mm long.

In open grass lands, common, fl. all the year; apparently not widely distributed in the Philippines. A native of tropical America, introduced in the tropics of the Old World.

2. P. **LUNATUS** L. Patani (Tag.); Lima Bean.

A scandent, slender, annual, glabrous or sparingly pubescent, herbaceous vine reaching a length of 4 m or more, the stipules small, basifixed. Leaflets ovate, acuminate, thin, 6 to 12 cm long. Racemes axillary, solitary, peduncled, 8 to 20 cm long. Flowers long-pedicelled, about 13 mm long, the calyx pale-greenish, the corolla much longer than the calyx, greenish or pale-yellowish. Pods oblong, somewhat curved, 6 to 12 cm long, about 2 cm wide, containing from 1 to 4 large, variously colored or white seeds. (Fl. Filip. pl. *352*, *369*.)

Frequently cultivated for its edible beans, fl. Sept.–Apr. Cultivated in all tropical and warm countries, a native of tropical America.

*3. P. **VULGARIS** L. Habichuela (Sp.); Common Bean.

An annual nearly glabrous or slightly hairy, erect, branched plant, or a slender twining vine. Leaves 3-foliolate, the leaflets ovate, acuminate, base rounded, 7 to 11 cm long, the lateral ones inequilateral. Racemes axillary, few-flowered, shorter than the leaves, the pedicels longer than the calyx. Flowers white, turning straw-colored or somewhat pink-purplish, 1.5 to 2 cm long. Bracteoles ovate, green, persistent. Pods linear, somewhat curved, 10 to 15 cm long, about 1 cm wide.

Commonly cultivated by Chinese gardeners for the Manila market, fl. Nov.–May. Cultivated in all warm countries, where native uncertain.

4. **P. adenanthus** G. F. W. Meyer.

A rather slender, glabrous, twining, herbaceous vine 2 to 5 m or more in length. Leaflets firm, 8 to 14 cm long, oblong-ovate, entire, acute or acuminate, base rounded, 3-nerved. Racemes axillary, long-peduncled, the flowers few, crowded at the ends. Flowers 2.5 to 3 cm long. Calyx green or purplish, the three lower teeth lanceolate, acuminate, the two upper shorter, wholly or partly connate. Standard 3 to 3.5 cm wide, retuse, white, tinged with purple; wings with more purple than the standard; keel white, all the petals turning brownish-yellow before falling. Pods linear, recurved, flat, many-seeded, 8 to 10 cm long, about 1 cm wide, acuminate.

In thickets, especially in low wet lands, fl. Nov.–Apr.; widely distributed in the Philippines. Tropics generally.

5. **P. minimus** Roxb.

A slender, twining, nearly glabrous annual reaching a length of 1 to 2 m. Leaflets oblong-ovate to oblong-lanceolate, acute or obtuse, 3 to 7 cm long, entire, the stipules small, peltate. Racemes slender, axillary, long-peduncled, the flowers few, usually 2 or 3, only one opening at a time. Corolla yellow, about 1.3 cm long, the standard 1.5 cm wide, strongly recurved. Pods 4 to 5 cm long, 3 mm wide, nearly cylindric.

In thickets and among coarse grasses, Masambong, fl. Nov.–Apr.; of local occurrence in the Philippines. Southern China.

6. P. **CALCARATUS** Roxb.

A slender, herbaceous, nearly glabrous or somewhat pubescent vine, the stipules peltate. Leaflets ovate to oblong-ovate, acute or acuminate, entire and shallowly-lobed ones commonly found on the same plant, 5 to 10 cm long. Racemes long-peduncled, flowers few at the apex, yellow, about 1.5 cm long. Pods slender, slightly appressed-hairy or glabrous, 6 to 10 cm long, about 5 mm wide, the valves twisted when dry.

In open grassy places opposite Guadalupe, fl. most of the year; widely distributed in the Philippines, undoubtedly introduced. A native of tropical Asia, now found in most warm countries, wild or cultivated.

*7. P. RADIATUS L. Mungos (Tag.); Green Gram.

An erect or climbing annual herb, branched from the base, or more or less clothed with spreading, brownish hairs. Leaflets ovate, entire, acuminate, 8 to 15 cm long, the lateral ones inequilateral. Flowers about 1 cm long, yellow, racemosely arranged near the ends of the short peduncles, the pedicels very short. Pods linear, spreading, 6 to 8 cm long, about 6 mm wide, hirsute with scattered, long, brownish hairs. Seeds 4 to 6 mm long.

Rarely cultivated in our area, fl. Nov.–Jan., and probably in other months; extensively cultivated in many parts of the Philippines, but scarcely spontaneous. A native of the Old World, now cultivated in most warm countries.

54. VIGNA Savi

Twining or spreading herbaceous vines similar to the preceding genus, differing chiefly in having the keel not or but slightly curved and not twisted. Calyx campanulate, the teeth long or short, the upper 2 often connate. Corolla much-exserted; keel truncate or with an ascending or slightly recurved beak. Stamens diadelphous. Ovary many-ovuled; style bearded along one side below the stigma. Pods linear. (In honor of D. Vigna, an early Italian botanist.)

Species 40 to 50, chiefly tropical, 4 in the Philippines.

1. Pods glabrous; keel not produced into a beak.
    2. Pods very long, up to 60 cm in length; cultivated.... 1. *V. sesquipedalis*
    2. Pods less than 7 cm long; a littoral species with yellow flowers. 2. *V. luteola*
1. Pods densely pilose; keel prolonged into a beak........................ 3. *V. pilosa*

*1. V. SESQUIPEDALIS L. Sitao (Tag.).

An annual, scandent, herbaceous, nearly glabrous vine, the stipules about 1 cm long, attached above the middle. Leaflets ovate-rhomboid, acute, entire or nearly so, 6 to 15 cm long, the nerves often purplish. Racemes few, axillary, long-peduncled. Flowers 3 to 6, crowded at the ends of the peduncles. Calyx greenish, 1 cm long, the teeth lanceolate, long-acuminate. Corolla pale-purplish, usually about 2 cm long. Pods slender, usually purplish, less than 1 cm wide, 20 to 40 cm long, many-seeded. (Fl. Filip. *pl. 286, 285, V. sinensis.*)

Commonly cultivated for its edible pods and beans, fl. all the year; widely cultivated in the Philippines, but scarcely spontaneous, probably a native of China. Cultivated in most warm and tropical countries.

2. V. lutea (Sw.) A. Gray.

A prostrate or climbing herbaceous annual vine, glabrous throughout. Leaves 3-foliolate, their petioles 5 to 10 cm long. Leaflets broadly ovate to oblong-ovate, or suborbicular-ovate, shining, acute or rounded, 5 to 10 cm long, stipellate. Scapes axillary, erect, 10 to 20 cm long, bearing numerous, racemosely arranged flowers at the apex, but 2 or 3 flowers opening at one time. Flowers yellow, 1.5 cm long, the standard suborbicular, retuse, 1.8 cm wide. Pods subcylindric, 4 to 5 cm long, 6 to 7 mm wide, reflexed, each containing from 3 to 6 ellipsoid seeds 5 to 6 mm long.

In thickets along the seashore and on sandy beaches, Pasay, Malabon, etc., fl. Aug.–May; in littoral districts throughout the Philippines. Tropics of the world.

3. **V. pilosa** (Roxb.) Baker.

A slender, twining, herbaceous, more or less pubescent, annual vine reaching a height of 2 to 3 m. Leaflets ovate to lanceolate, 4 to 9 cm long, entire, acute, base rounded. Racemes short, few-flowered. Corolla purplish, nearly 1.5 cm long. Pod 5 to 7 cm long, about 7 mm wide, slightly curved, beaked, swollen, densely covered with spreading or appressed, persistent brown hairs.

In dry thickets, Caloocan to San Pedro Macati, fl. Nov.–March; of very local occurrence in the Philippines. India.

55. **PACHYRRHIZUS** Richard

Herbaceous twining vines from large, turnip-shaped, fleshy roots. Leaves 3-foliolate, the leaflets stipellate, lobed or sinuate. Racemes axillary, long, bearing the flowers in fascicles at the thickened nodes. Calyx 2-lipped, the tube about as long as the lips, the upper lip notched, the lower one 3-toothed. Corolla exserted, the petals subequal; keel obtuse. Stamens diadelphous. Ovary many-ovuled; style bearded down the inner side below the oblique stigma. Pod linear, somewhat swollen, depressed between the seeds. (Greek "thick" and "root.")

Species 2 or 3 in Mexico and in tropical Africa, 1 introduced in the Philippines.

1. P. EROSUS (L.) Urb. (*P. angulatus* Rich.). Sincamas (Sp.-Fil.).

A rather coarse, scandent, herbaceous vine, somewhat pubescent, from rather large, edible, turnip-shaped, fleshy roots. Leaflets, at least the terminal one, broader than long, up to 15 cm long and 20 cm wide, base deltoid, irregularly and shallowly lobed in the upper half, the lateral ones inequilateral. Racemes up to 45 cm in length, the lower nodes produced into short branches, each node with several flowers. Flowers pale-blue or blue and white, 2 to 2.5 cm long, the standard about 1.5 cm wide. Pods about 10 cm long, 10 to 12 mm wide, flat, pubescent, containing 8 to 10 seeds. (Fl. Filip. *pl. 249.*)

Common in thickets, fl. Sept.–Jan., also cultivated; throughout the Philippines, thoroughly naturalized. A native of tropical America, now widely distributed in the tropics.

56. **DOLICHOS** Linnaeus

Twining herbs with 3-foliolate leaves, the leaflets stipellate. Flowers axillary, solitary or in racemes. Calyx-tube campanulate, the teeth long or short. Corolla exserted, the petals equal or subequal in length, the keel obtuse or beaked. Stamens diadelphous. Ovary many-ovuled; style bearded down the inner side or around the stigma. Pod flat, linear to oblong. (Greek "long" from extended growth of some species.)

Species about 20 in the tropics of both hemispheres, 3 in the Philippines.

Flowers many, about 2 cm long; pods large, about 2 cm wide.... 1. *D. lablab*
Flowers few, about 1 cm long; pods small, less than 1 cm wide. 2. *D. falcatus*

1. D. LABLAB L. Batao (Tag.).

A glabrous, twining, annual vine reaching a length of 6 m or more, the stems often purplish. Leaves 3-foliolate, the stipules small, basifixed; leaflets ovate, acute or acuminate, entire, 7 to 15 cm long. Racemes erect, long-peduncled, 15 to 25 cm long. Flowers few to many, pink-purple or nearly white, about 2 cm long. Pods oblong, flattened, 7 to 12 cm long, about 2 cm wide, acuminate, containing 3 to 5 seeds. (Fl. Filip. *pl. 292, Lablab cultratus.*)

Commonly cultivated for its edible beans, frequent in thickets etc., fl. Oct.–May; widely distributed in the Philippines, wild and cultivated, but certainly introduced. Tropics of the Old World.

2. **D. falcatus** Klein.

A slender, twining, glabrous or nearly glabrous annual vine reaching a length of 3 to 4 m. Leaflets ovate to oblong-ovate, 2 to 6 cm long, subentire to somewhat 3-lobed, acute or acuminate, base broad. Peduncles solitary, axillary, slender, equaling or exceeding the petioles, each bearing from 1 to 3 or 4 flowers at the apex. Flowers pink and white or purplish, 1 cm long. Pods oblong, somewhat curved, 5 to 7 cm long, about 8 mm wide.

In dry thickets, Guadalupe etc., common, fl. Oct.–March; widely distributed in Luzon. India.

57. PSOPHOCARPUS Necker

Twining herbaceous or suffrutescent vines from tuberous roots. Leaves 3-foliolate, the stipules produced below the point of attachment; leaflets stipellate. Flowers rather large, pale-blue or purplish. Calyx-teeth shorter than the tube, the upper 2 connate. Corolla much-exserted, petals equal, the keel incurved. Stamens monadelphous, the upper one free below. Ovary many-ovuled; style long, bearded around the stigma. Pod square, oblong, distinctly longitudinally winged along each angle, septate between the seeds.

Species 3 or 4 in the tropics of the Old World, 1 in the Philippines.

1. P. TETRAGONOLOBUS (L.) DC. Segidilla (Sp.-Fil.); Calamismis (Tag.); Asparagus Bean.

A glabrous, twining, annual vine reaching a length of 6 m or more. Leaves 3-foliolate, leaflets ovate, entire, acuminate, 8 to 14 cm long, base deltoid. Racemes few-flowered up to 15 cm in length. Flowers light-blue, 3 to 3.5 cm long. Pod square, 10 to 20 cm long, about 2 cm thick, 4-winged, the wings about 5 mm wide, crisped. (Fl. Filip. *pl. 293.*)

Commonly cultivated for its edible pods, occasionally spontaneous, fl. Oct.–Dec., certainly introduced. India and Malaya.

66. OXALIDACEAE (OXALIS OR BALIMBING FAMILY)

Herbs or trees, glabrous or pubescent. Leaves opposite or alternate, usually 2-stipulate. Inflorescence axillary or cauline. Flowers umbellate or cymose, perfect, regular, small. Sepals 5, imbricate. Petals 5. Stamens 10, in 2 series; filaments somewhat united below. Ovary 5-celled; ovules one to many in each cell; styles free. Fruit capsular or fleshy, dehiscent or indehiscent.

Genera 7, species about 250, chiefly in temperate regions, 3 genera and 6 species in the Philippines.

1. Herbs; fruit a capsule.
   2. Leaves 3-foliolate; valves of the capsule cohering with the axis. 1. *Oxalis*
   2. Leaves pinnate; valves of the capsule separating from the axis to the base.......... 2. *Biophytum*
1. Trees or shrubs with pinnate leaves and fleshy fruits.......... 3. *Averrhoa*

1. OXALIS Linnaeus

Small herbs acid in taste, usually postrate and creeping, the leaves alternate, 3-foliolate; stipules small. Flowers on axillary 1 to few-flowered peduncles, regular, yellow. Sepals 5, imbricate. Petals 5, hypogynous. Stamens 10, free, or united at the base, all anther-bearing. Ovary 5-lobed, 5-celled; styles 5, distinct. Fruit a capsule dehiscing loculicidally. (From the Greek "sour.")

Species about 200, chiefly in tropical and temperate South America and South Africa, 2 in the Philippines.

Leaflets less than 1.5 cm long; flowers yellow .... 1. *O. repens*
Leaflets exceeding 1.5 cm in length; flowers purplish; cultivated only. 2. *O martiana*

1. **O. repens** Thunb. Taingandaga, Susocoyili (Tag.).

A small, variable, prostrate herb, somewhat pubescent with long, scattered hairs, the stems creeping, up to 50 cm in length, usually rooting at the nodes. Leaves 3-foliolate, their petioles 5 cm long or less; leaflets obcordate, 0.5 to 1.5 cm long, sessile. Flowers yellow, one to several on each peduncle, subumbellately disposed, nearly 1 cm long, the petals obcordate. Capsules tomentose, subcylindric, 1 to 1.8 cm long.

In waste places, along old walls, etc., fl. all the year; widely distributed in the Philippines, ascending to an altitude of 2,300 m. Widely distributed in temperate and tropical parts of the world, often confused with *O. corniculata* L.

*2. O. MARTIANA Zucc.

Erect, from tuberous rootstocks or small bulbs, the leaves all radical, their petioles up to 25 cm long, ciliate-pubescent. Leaflets broadly obcordate or suborbicular-obcordate, about 3 cm long, often wider than long, minutely glandular on the lower surface, slightly pilose-ciliate. Flowers umbellate, few to many, the peduncles about as long as the leaves, the corolla lilac or pink-purple, about 12 mm long.

Not uncommon in cultivation, Singalon, fl. most of the year; introduced from tropical America.

2. BIOPHYTUM DeCandolle

Annual, erect, small, unbranched herbs. Leaves abruptly pinnate, crowded at the top of the stem, the leaflets opposite; petiole swollen at the base. Peduncles terminal. Flowers unbellate, small, yellow. Sepals 5, lanceolate, acuminate. Petals 5. Stamens 10, filaments free, the outer 5 smaller. Capsule ovoid to oblong, loculicidally dehiscent. (Greek "life" and "plant" from the sensitive leaves).

Species about 20 in tropical Asia, Africa, and America, 2 in the Philippines.

1. **B. sensitivum** (L.) DC. Macahia (Tag.).

Stems up to 30 cm high, usually shorter. Leaves numerous, crowded at the apex of the stem, 5 to 12 long, the leaflets 8 to 14 pairs, the upper ones gradually increasing in size, 1.5 cm long or less, oblong to oblong-obovate, often somewhat curved, apex rounded or apiculate. Peduncles numerous, usually about as long as the leaves. Flowers many, crowded at the apices of the peduncles, shortly pedicelled. Sepals subulate-lanceolate, striate, about 7 mm long. Petals yellow. Capsules shorter than the persistent calyx.

San Pedro Macati, Pasay, etc., in dry places, fl. Aug.–Oct., and probably in other months; widely distributed in the Philippines at low and medium altitudes. Tropical Asia, Africa, and America.

3. AVERRHOA Linnaeus

Small trees. Leaves alternate, odd-pinnate, the leaflets opposite or nearly so; stipules none. Flowers small, regular, in panicled cymes, either axillary or from the trunk and larger branches. Sepals 5, imbricate. Petals 5, contorted. Stamens 10, united at the base, all perfect or 5 without anthers. Ovary 5-lobed, 5-celled; styles 5, distinct; stigmas capitate; ovules numerous. Fruit fleshy, oblong, cylindric or longitudinally 5-lobed. Seeds naked or arillate, albumen scanty, fleshy; embryo straight. (In honor of Averrhoës, latinized form of Ibn-Roshd, an Arabian philosopher.)

Three or four species in tropical America, two now widely distributed in the tropics in cultivation, both found in the Philippines.

Inflorescence mostly axillary; leaflets usually 5 pairs, glabrous; fruit with 5 sharp lobes, star-shaped in cross-section........................ 1. *A. carambola*
Inflorescence on the trunk and larger branches; leaflets 10 to 17 pairs, pubescent; fruit cylindric or with 5 obscure rounded lobes.... 2. *A. bilimbi*

1. A. CARAMBOLA L. Bilimbing (Sp.-Fil.).

A shrub or small tree 6 m high or less. Leaves pinnate, about 15 cm long; leaflets quite glabrous, usually about 5 pairs, ovate to ovate-lanceolate, acuminate, the upper ones about 5 cm long, the lower ones smaller. Panicles small, axillary, usually about 3 cm long. Flowers 5 to 6 mm long, somewhat campanulate. Calyx reddish-purple. Petals pale-purple to rather bright-purple, often margined with white. Stamens 10, the 5 shorter ones usually without anthers. Fruit fleshy, green, or greenish-yellow usually about 6 cm long, with 5 longitudinal, sharp, angular lobes, acid, edible. Seeds arillate. (Fl. Filip. *pl. 139.*)

Rather common in cultivation, fl. most of the year. Widely distributed in the Philippines and throughout the tropics, a native of tropical America.

Curiously when this species was introduced into the Philippines it appears to have received the common name used for *A. bilimbi* L. in most other countries, which error has persisted.

2. A. BILIMBI L. Camias, Iba (Tag.).

A small tree 5 to 12 m high. Leaves pinnate, 20 to 60 cm long, the rachis and leaflets pubescent; leaflets 10 to 17 pairs, oblong, acuminate, 5 to 10 cm long. Panicles from the trunk and larger branches, usually fascicled, pubescent, 15 cm long or less. Flowers about 1.5 cm long, somewhat fragrant. Calyx pubescent. Corolla purple, often marked with white. Fruit subcylindric or with 5, obscure, broad, rounded, longitudinal lobes, green, acid, edible, about 4 cm long. Seeds not arillate. (Fl. Filip. *pl. 138.*)

Cultivated, not uncommon, fl. most of the year; widely distributed in the Philippines. Throughout the tropics, a native of tropical America.

The closely allied family *Geraniaceae* is represented in the Philippines only by introduced and cultivated forms, a few species of *Pelargonium* ("geranium" of gardeners) which do not, as rule, thrive in Manila. A single species, *Pelargonium graveolens* Ait., a native of South Africa, the "rose geranium" of America and "malva rosa" of Spaniards, is extensively cultivated here as a pot-plant, but it very rarely or never flowers in Manila.

67. ERYTHROXYLACEAE (COCA FAMILY)

Glabrous slender shrubs or trees with alternate, entire leaves, involute in bud, the stipules solitary, intrapetiolar. Flowers axillary, solitary or fascicled, 5-merous, perfect. Calyx persistent, 5-lobed. Petals 5, free, clawed, ligulate at the base inside. Stamens 10, the filaments connate into a shallow cup. Ovary superior, 3-celled, 2 cells usually sterile, the third with 1 or 2 ovules; styles 3, free or connate. Fruit drupaceous, the pulp scanty.

Genera 2, species about 195, of wide tropical distribution, but mostly in tropical America.

1. ERYTHROXYLUM P. Browne

Characters of the Family as given above. (From the Greek "red" and "wood.")

Species 194, 3 in the Philippines, the following introduced.

*1. E. COCA Lam. Cocaine Plant.

An erect, branched, glabrous shrub 1 to 2 m high. Leaves thin, elliptic-oblong or narrowly obovate-elliptic, 2 to 7 cm long, obtuse, mucronulate, base acute, longitudinal nerves or lines 2 or 4, slender, more distinct in young leaves. Flowers white, axillary, several in each axil, their pedicels 3 to 4 long. Petals about 4.5 mm long, the blade elliptic. Fruit oblong, red, the pulp thin, 7 to 10 mm long, cylindric, when dry 3-angled.

Cultivated, Singalon, Cementerio del Norte, etc., fl. most of the year. A native of South America, now cultivated in many tropical countries and of very recent introduction in the Philippines.

68. ZYGOPHYLLACEAE (TRIBULUS FAMILY)

Herbs with opposite, stipulate, abruptly pinnate leaves. Peduncles axillary, solitary, 1-flowered. Flowers perfect, regular, rather showy, yellow. Sepals 5, imbricate, deciduous. Petals 5, spreading, imbricate. Disk annular, 10-lobed. Stamens 10, inserted on the base of the disk, the 5 longer ones opposite the petals, the 5 shorter ones with a gland at the base. Ovary sessile, lobed, usually of 4 or 5 carpels. Fruit of several, spinous, indehiscent cocci. Seeds obliquely pendulous.

Genera about 20, species more than 100, chiefly tropical and subtropical, one genus and species known from the Philippines.

1. TRIBULUS Linnaeus

Characters of the Family as given above. (Greek "caltrop," literally 3-pointed.)

About 15 species, in most warm countries, 1 introduced in the Philippines.

1. T. CISTOIDES L.

A perennial, prostrate or spreading, more or less pubescent plant with elongated stems up to 1 m in length. Leaves 4 to 6 cm long; leaflets about 6 pairs, oblong or oblong-lanceolate, apiculate, 0.7 to 1.5 cm long, gray-pubescent beneath. Peduncles 2 to 4 cm long. Flowers yellow, about 3 cm in diameter. Fruits subglobose, about 1 cm in diameter, hairy, each coccus with about 2 stout sharp spines.

Abundant about the Parañaque church, fl. most of the year; known from several towns in Luzon, local and certainly an introduced plant in the Philippines. Tropics generally.

69. RUTACEAE (ORANGE OR LUCBAN FAMILY)

Trees or shrubs, sometimes climbing, often spiny, the leaves with numerous or few, pellucid, oil-glands. Leaves alternate or opposite, simple or compound. Flowers regular, perfect, axillary or terminal, solitary, or in fascicles, racemes, cymes, or panicles. Calyx 4- or 5-toothed. Petals 4 or 5 or more, valvate or imbricate, free. Stamens 4 to 10, or in some genera up to 60, hypogynous, the filaments free or connate into a tube, inserted around the disk. Ovary of 4 or 5, free or connate carpels, or simple and many-celled; styles free or variously united; ovules 1 or 2 to many in each cell. Fruit a fleshy berry or drupe, or capsular, or of 1 to 4 capsule-like cocci.

Genera 121, species more than 700, in most tropical and many temperate countries, 18 genera and about 50 species in the Philippines.

1. Ovules 1 or 2 in each cell.
  2. Unarmed shrubs.
    3. Style very short, persistent.......... 1. *Glycosmis*
    3. Style jointed on the ovary, deciduous; shrubs or trees with pinnate leaves.
      4. Filaments linear-subulate.......... 2. *Murraya*
      4. Filaments dilated below.......... 3. *Clausena*
  2. Spiny shrubs with 3-foliolate leaves.......... 4. *Triphasia*
1. Ovules 4 to many in each cell.
  2. Leaves 1-foliolate.......... 5. *Citrus*
  2. Leaves 3-foliolate.......... 6. *Aegle*

1. GLYCOSMIS Correa

Spineless shrubs or trees, with 1- to 5-foliolate leaves, the leaflets entire, alternate. Flowers small, in short, narrow, axillary panicles. Calyx 4- or 5-toothed, the segments imbricate. Petals 4 or 5, imbricate. Stamens 8 to 10, free, the filaments dilated below. Ovary 2- to 5-celled, the style very short, not jointed, persistent. Ovules 1 in each cell. Fruit a globose, fleshy, 1 to 3-seeded berry. (From the Greek "sweet.")

Species 5 or more, tropical Asia to Australia, the following exceeding variable one, and perhaps one other in the Philippines.

1. **Glycosmis cochinchinensis** (Lour.) Pierre (*G. pentaphylla* Correa). Guing-guing (Tag.).

A shrub 1 to 5 m high, the leaves usually with from 3 to 5 pinnately arranged leaflets, sometimes reduced to one or two, all often found on the same plant. Leaflets oblong-lanceolate to lanceolate, acuminate, 5 to 18

cm long, 2 to 7 cm wide. Flowers small, white, about 6 mm in diameter, borne in axillary, solitary or paired, interrupted, narrow, cymose panicles, 5 cm long or less. Calyx-teeth 5, short. Petals oblong-ovate, 5 mm long, white. Stamens 10. Fruit fleshy, globose, pink or reddish, 1 cm in diameter, containing a single globose seed 5 mm in diameter. (Fl. Filip. *pl. 137, G. trifoliata.*)

Occasional in thickets and hedges, fl. most of the year; widely distributed in the Philippines at low and medium altitudes. India to southern China, Malaya, and tropical Australia.

2. MURRAYA Linnaeus

Small trees or shrubs with odd-pinnate leaves. Flowers in axillary or terminal small cymes. Calyx small, deeply 5-cleft. Petals 5, imbricate, free. Stamens 10, inserted around an elongated disk, the filaments slender, the alternating ones shorter. Ovary 2- to 5-celled, narrowed above into the style; ovules 1 or 2 in each cell. Fruit small, fleshy, 1-, sometimes 2-seeded. (In honor of J. A. Murray, a Danish botanist.)

Species 4 or 5 in tropical Asia and Malaya, 2 in the Philippines.

1. **M. exotica** L. Camuning (Tag., Vis.).

A shrub or small glabrous tree with very hard wood, 3 to 8 m high. Leaves 8 to 15 cm long, the leaflets usually 3 to 7, sometimes reduced to 1; leaflets oblong to ovate, elliptic or subrhomboid, blunt-acuminate, entire, 2 to 7 cm long, or in one form up to 14 cm in length. Cymes short, terminal or in the upper axils, usually few-flowered. Flowers white, very fragrant, 1.5 to 2 cm long. Fruit ovoid, fleshy, red, 1 to 1.5 cm long. (Fl. Filip. *pl. 155, M. sumatrana.*)

Frequently cultivated and also abundant in dry thickets about Manila, fl. July–Sept., and probably in other months; widely distributed in the Philippines. India to China southward to Australia and Polynesia.

3. CLAUSENA Burmann

Erect, spineless shrubs or small trees, aromatic when crushed. Leaves odd-pinnate. Flowers small, in terminal or axillary panicles. Calyx 4- or 5-lobed. Petals 4 or 5, free, imbricate. Stamens 8 to 10, inserted around an elongated disk, the filaments enlarged below, subulate at the tips, the alternating ones shorter. Ovary stipitate, usually 4- or 5-celled; ovules 2 in each cell. Fruit a fleshy, globose or ovoid, 2- to 5-celled berry. (After P. Clausen, a Danish botanist.)

Species about 20, tropical Asia, Africa, and Australia, 4 or 5 in the Philippines.

1. **C. anisum-olens** (Blanco) Merr. Cayomanis, Calomata (Tag.).

A small tree 3 to 6 m high, nearly or quite glabrous. Leaves 20 to 30 cm long; leaflets 7 to 11, ovate-lanceolate to lanceolate, 5 to 11 cm long, very aromatic when crushed, acuminate, crenate, base inequilateral. Panicles 15 to 20 cm long, terminal and in the upper axils, narrowly pyramidal. Flowers greenish-white, fragrant, about 8 mm in diameter, 5-merous. Fruit globose or ovoid, nearly 1 cm in diameter, whitish when mature.

Occasionally cultivated, Singalon, fl. May–June; rather widely distributed in the Philippines. Endemic.

4. TRIPHASIA Loureiro

An erect, branched, spiny shrub with 3-foliolate leaves. Flowers axillary, solitary, or in 3-flowered cymes. Calyx 3-lobed. Petals 3, free, imbricate. Stamens 6. Ovary ovoid, 3-celled, narrowed above, the style deciduous; ovules 1 in each cell. Fruit a small, ovoid, 1- to 3-celled, 1- to 3-seeded berry. (Greek, "three-fold.")

A monotypic genus, probably a native of southeastern Asia.

1. T. TRIFOLIA (Burm.) P. Wils. (*T. trifoliata* DC.). Limoncito (Sp.-Fil.).

A glabrous shrub 1 to 3 m high, the spines in pairs, slender, straight. Leaflets ovate to oblong-ovate, obtuse or retuse, crenate, the terminal one 2 to 4 cm long, the lateral ones smaller, the petioles very short. Flowers very shortly pedicelled, white, fragrant, about 1 cm long. Fruit ovoid, fleshy, red, edible, gland-dotted, about 12 mm long. (Fl. Filip. *pl. 129.*)

In thickets, sometimes cultivated, fl. most of the year; widely distributed in the Philippines, certainly introduced, but now naturalized. Generally cultivated in the tropics of the East and in other tropical countries; probably a native of tropical Asia.

5. CITRUS Linnaeus

Shrubs or trees, usually spiny. Leaves alternate, 1-foliolate, the petiole often winged. Flowers axillary, solitary or in short racemes or cymes, fragrant. Calyx mostly cup-shaped, 3- to 5-toothed. Petals 4 to 8, thick, imbricate. Stamens 10 to 60, inserted around the disk, the filaments more or less connate or nearly free. Ovary usually many-celled; ovules 4 to 8 in each cell, 2-seriate. Fruit a medium to very large, oblong or globose, fleshy berry, 5- to many-celled, the pericarp leathery. (The Latin name.)

Species 6 or more, very variable, India to Japan south to Australia, some cultivated in most subtropical and tropical countries, most of the species in the Philippines.

In addition to the species considered below, imported oranges are commonly sold in the Manila markets. A common native form is a tight-skinned sour orange locally known as "cahel" (*Citrus aurantium* L.); a more common loose-skinned form is known as "narangita" or "sintones" (*Citrus nobilis* Lour). Imported lemons (*C. medica* L.) are to be had at all seasons.

1. Flowers axillary, usually solitary, rarely in pairs........................ 1. *C. mitis*
1. Flowers in short racemes.
    2. Petioles narrowly winged; flowers less than 1.5 cm long; fruit small. 2. *C. lima*
    2. Petioles very broadly winged; flowers about 2 cm long; fruit very large. 3. *C. decumana*

*1. **C. mitis** Blanco. Calamondin, Calamansi (Tag.).

A glabrous, somewhat spiny tree 4 to 5 m high. Leaflets elliptic to oblong-elliptic, 4 to 8 cm long, apex usually retuse, base acute, margins slightly crenulate, the petioles very narrowly or scarcely winged, about 1 cm long. Flowers axillary, solitary, rarely in pairs, white, short-pedicelled. Calyx 5-toothed. Petals elliptic-oblong, about 12 m long. Stamens about 20, the filaments more or less united into a tube. Fruit globose, yellow, 2 to 2.5 cm in diameter, 6- or 7-celled, the skin thin. (Fl. Filip. *pl. 185.*)

Occasionally cultivated, fl. most of the year; rather widely distributed in the Philippines. Endemic.

*2. C. LIMA Lunan (*C. acida* Roxb.). Dayap (Tag.); Limon (Sp.-Fil.).

A shrub or small tree 2 to 4 m high, glabrous throughout, the branches armed with slender, solitary, axillary, sharp spines 1 cm long or less. Leaves oblong-ovate to elliptic-ovate, crenulate, 4 to 6 cm long, acute or obtuse; petioles 1 to 1.5 cm long, narrowly winged, oblanceolate. Racemes short, axillary, few-flowered. Flowers white, fragrant. Calyx about 5 mm in diameter, the teeth short. Petals 4, oblong, 10 to 12 mm long, glandular-punctate. Stamens 10 to 25, free or nearly so. Fruit subglobose, yellow, 3 to 5 cm in diameter, 10-celled or more, the skin thin, the pulp sharply acid.

Cultivated, fl. most of the year; widely distributed in the Philippines, and undoubtedly of prehistoric introduction. India and Malaya; cultivated in all tropical countries.

*2. C. DECUMANA Murr. Lucban, Suha (Tag.); Pomelo.

A tree 5 to 10 m high, the branches with solitary spines, the branchlets compressed, pubescent, green. Leaflets ovate-oblong to elliptic, entire or nearly so, apex retuse, sparingly pubescent beneath and on the margins, 8 to 12 cm long; petioles broadly winged, obovate. Racemes axillary, short, the flowers crowded, white, very fragrant. Calyx about 1 cm in diameter, shallow, broadly 4-toothed. Petals 4, oblong, 2 cm long. Stamens 16 to 24. Fruit large, globose or obovoid, up to 15 cm or more in diameter, the rind very thick, the pulp pale-yellow to pink or red, sweet or acid, the vescicles large, distinct. (Fl. Filip. *pl. 304.*)

Commonly cultivated, fl. most of the year; throughout the Philippines in cultivation, but probably not a native of the Archipelago. A native of Malaya or Polynesia, now cultivated in most tropical and subtropical countries.

6. AEGLE Correa

Trees with alternate, 3-foliolate leaves, spiny. Flowers in short axillary racemes or clusters. Calyx small, 4- or 5-toothed. Petals 4 or 5, free, spreading, imbricate in bud. Stamens 10 or more, inserted around the disk. Ovary ovoid, 8- to 20-celled; ovules numerous, 2-seriate. Fruit large, ovoid to oblong, 8- to 15-celled, the cells many-seeded, the rind thick, the pulp aromatic. (From Aegle, one of the Hesperides, of Greek mythology.)

Species 3 or 4, tropical Asia and Africa, 1 in the Philippines.

1. **A. glutinosa** (Blanco) Merr. Taboc, Tabog (Tag.).

A tree reaching a height of 10 m, glabrous except the younger branchlets and inflorescence. Trunk usually spiny, small spines usually present on the branches. Leaves 3-foliolate, oblong-ovate to elliptic, obtuse or retuse, entire or somewhat crenate, the terminal one 6 to 10 cm long, the lateral ones smaller. Flowers white, fragrant, about 1.5 cm long. Fruit green or yellow, oblong, about 10 cm long, 10-celled, the pericarp rough, the seeds numerous, surrounded by a fibrous coating. (Fl. Filip. *pl. 124, A. decandra.*)

Occasional in Manila, fl. Mar.–Apr.; widely distributed in Luzon. Endemic.

In addition to the species considered above, the European rue (*Ruta graveolens* L.), locally known under its Spanish name, *ruda*, is occasionally cultivated for medicinal purposes. It is an undershrub less than 1 m high.

70. SIMARUBACEAE (QUASSIA FAMILY)

Trees or shrubs, sometimes climbing, with usually bitter bark, and alternate, pinnate, leaves. Inflorescence axillary or terminal, racemose, cymose, or paniculate. Flowers regular. Calyx 3- to 5-lobed. Petals 3 to 5, hypogynous. Disk annular or elongated, rarely none. Stamens as many as, or twice as many as, the petals, free. Ovary superior, free, 1- to 6-celled, entire or deeply lobed; ovules 1 or few in each cell; styles free or more or less united. Fruit drupaceous or capsular; seeds usually solitary.

Genera 32, species about 130, tropical and subtropical regions in both hemispheres, 8 genera and about 12 species in the Philippines.

Somewhat climbing, armed with short spines; petioles not winged; flowers small, white.. 1. *Harrisonia*
Erect, unarmed; petioles and leaf-rachis winged; flowers large, red. 2. *Quassia*

1. HARRISONIA R. Brown

Erect or somewhat climbing, spiny, glabrous or pubescent shrubs. Leaves odd-pinnate. Flowers perfect, racemose or cymose. Calyx small, 4- or 5-fid. Petals 4 to 5, longer than the calyx. Stamens twice as many as the petals, the filaments with small scales at the base; ovary globose, 4- or 5-lobed, 4- or 5-celled; ovules solitary. Fruit berry-like, fleshy, globose. (In honor of J. Harrison, an English horticulturist.)

Species 3 or 4, tropical Africa and Asia through Malaya to Australia, 2 in the Philippines.

1. **H. perforata** (Blanco) Merr. (*H. paucijuga* Benn.). Asimao, Laiya, Mamiquil (Tag.).

Somewhat climbing or nearly erect, 2 to 4 m high, the branches armed with short sharp spines. Leaves 5 to 10 cm long, slightly pubescent or nearly glabrous; leaflets oblong-ovate, 1.5 to 3.5 cm long, entire or crenate, acute or obtuse. Racemes 3 to 5 cm long, terminal. Flowers white; petals about 6 mm long; filaments villous at the base. Fruit globose, fleshy, glabrous, 1 to 1.5 cm in diameter. (Fl. Filip. *pl. 23 Fagara piperita.*)

In dry thickets near Fort McKinley, fl. Apr.–June; of local occurrence in the Philippines. India to China and Malaya.

2. QUASSIA Linnaeus

A glabrous erect shrub, intensely bitter. Leaves alternate, odd-pinnate, the petiole and rachis winged. Flowers large, perfect, in terminal simple racemes or panicles. Calyx small, 5-partite. Petals 5, elongated, erect, not spreading. Stamens 10, inserted at the base of the large columnar torus. Ovary 5-lobed. Drupes 5 or fewer, spreading. (Named after Quassi, or Coissi, a negro slave in Surinam who used the plant for medicine.)

A monotypic genus of tropical America.

1. Q. AMARA L. Corales (Sp.-Fil.); Quassia.

A glabrous shrub 2 to 3.5 m high. Leaves alternate, about 20 cm long, the petiole and rachis broadly winged; leaflets 5, sessile, elliptic-oblong, or the terminal one oblong-obovate, acuminate, 7 to 12 cm long. Racemes 8 to 20 cm long. Flowers bright-red, the corolla about 2.5 cm long.

Cultivated only, fl. Nov.–March. A native of tropical America, of comparatively recent introduction here.

71. BURSERACEAE (CANARIUM OR PILI FAMILY)

Trees or shrubs, resiniferous, with alternate or opposite, odd-pinnate leaves. Inflorescence axillary or terminal, paniculate or racemose. Flowers small, regular, perfect or polygamous. Calyx 3- to 6-lobed. Petals 3 to 6, free, rarely connate, imbricate or valvate. Disk annular or cup-shaped. Stamens 3 to 12, equal or unequal, inserted at the base of, or on the margin of the disk, free, or sometimes united at the base. Ovary free, 1- to 5-celled; ovules 1 or 2 in each cell; style simple. Fruit drupe-like, indehiscent, the pulp usually thin, the endocarp bony, often 3-angled, 1- to 3-seeded.

Genera 19, species about 400 in the tropics of both hemispheres, 4 genera and about 40 species in the Philippines.

1. CANARIUM Linnaeus

Usually large trees with fragrant sticky resin. Leaves alternate, odd-pinnate. Flowers small, in terminal or axillary, often narrow panicles, perfect or polygamous. Calyx short, 3-lobed. Petals 3, free. Stamens 6, inserted on the margin of the disk, or outside of it. Ovary 2- or 3-celled; ovules 2 in each cell. Drupe ovoid to ellipsoid, often distinctly 3-angled, the pulp thin, the stone 1- to 3-celled, 1- to 3-seeded. (From the Malay name of one species.)

Species about 100 in tropical Asia and Malaya, about 35 in the Philippines.

1. C. villosum (Blume) F.-Vill. Pagsainguin (Tag.).

A tree reaching a height of 20 m, the young branches, leaves, and inflorescence more or less covered with soft brown hairs, in age becoming nearly glabrous. Leaves 20 to 50 cm long; leaflets 7 to 15, ovate to oblong-ovate, 6 to 18 cm long, entire, acuminate, base rounded or subcordate, oblique, the nerves prominent beneath. Inflorescence axillary, paniculate, 10 to 30 cm long, the primary branches distant, very short, or sometimes none. Flowers pubescent, greenish-white, 4 to 5 mm long, sessile, fasciculate. Fruit ovoid to ellipsoid, terete, not 3-angled, about 1 cm long. (Fl. Filip. *pl. 343, C. pimela.*)

In thickets, Masambong, occasional, fl. Mar.–Apr.; widely distributed in the Philippines. Endemic.

72. MELIACEAE (SANTOL FAMILY)

Trees or shrubs, rarely small undershrubs or herbs, with alternate, usually pinnate, sometimes 2- or 3-pinnate, rarely simple leaves. Flowers perfect or polygamo-dioecious, regular, in axillary or terminal panicles, racemes, spikes, or fascicles. Calyx 3- to 6-lobed, rarely entire or of free sepals. Petals 3 to 6, free or connate at the base, sometimes cohering with the staminal tube below. Anthers 4 to 12, sessile, usually borne inside of, or on the margin of a staminal tube. Disk tubular, annular, or none.

Ovary usually free, 2- to 5-celled; style simple; stigma capitate or disk-like; ovules usually 2 in each cell. Fruit capsular, drupe-like, or berry-like, dehiscent or indehiscent. Seeds various.

Genera 47, species about 800, in the tropics of both hemispheres, 18 genera, and about 90 species in the Philippines.

1. Leaves simple; a very low undershrub or herb........................ 1. *Turraea*
1. Leaves 3-foliolate; trees with baccate edible fruits............ 2. *Sandoricum*
1. Leaves simply pinnate.
  2. Flowers globose, small.
    3. Stamens 5 or 6, rarely more, in 1 series; ovary 1- or 2-celled. 3. *Aglaia*
    3. Stamens 10, in 2 series; ovary 3- to 5-celled.................... 4. *Lansium*
  2. Flowers elongated, cylindric.. 5. *Dysoxylum*
1. Leaves 2- or 3-pinnate.. 6. *Melia*

1. TURRAEA Linnaeus

Trees, shrubs, or in our representative a low subherbaceous undershrub. Leaves simple, entire or toothed. Inflorescence axillary, racemose, few-flowered. Flowers white or yellow, elongated. Calyx 4- or 5-fid. Petals 4 or 5, elongated, imbricate, spatulate. Staminal-tube elongated, toothed at the apex; anthers 8 or 10, alternating with the teeth, inserted just within the mouth. Disk annular or none. Ovary 4- or more-celled; cells 2-ovuled. Fruit a 4- or more-celled loculicidal capsule. (In honor of G. Turre, an early Italian botanist.)

Species 25 in tropical Asia and Africa, through Malaya, to Australia, 2 in the Philippines.

1. **T. humilis** (Blanco) Merr.

An erect, usually unbranched undershrub or suffrutescent herb 20 cm high or less, slightly pubescent. Leaves simple, elliptic-ovate, 2.5 to 8 cm long, margins sinuate-toothed. Racemes axillary, usually 3-flowered, short, erect. Flowers white, about 3.5 cm long. Corolla-tube slender, the lobes 5. (Fl. Filip. *pl. 181, T. pumila.*)

On banks about rocks and ledges, Guadalupe, San Juan del Monte, etc., fl. June; known in the Philippines only from the vicinity of Manila. Java.

2. SANDORICUM Cavanilles

Trees with 3-foliolate leaves and 5-merous flowers in axillary panicles. Calyx cup-shaped. Petals imbricate in bud, spreading. Staminal-tube cylindric, nearly as long as the petals, toothed. Stamens 10 or 8, included. Disk surrounding the ovary, laciniate. Ovary 5-celled, cells 2-ovuled. Fruit a large, fleshy, 3- to 5-celled berry, seeds 1 in each cell surrounded by a translucent, fleshy pulp. (From its Malay name, *santoor.*)

Species about 7, India and Malaya, 2 in the Philippines.

1. **S. KOETJAPE** (Burm. f.) Merr. (*S. indicum* Cav.). Santol (Tag.).

A tree reaching a height of 15 m, the young branches and leaves softly pubescent. Leaflets 10 to 25 cm long, acuminate, base rounded or obtuse, elliptic to oblong-ovate. Panicles 10 to 20 cm long, the flowers numerous, somewhat fascicled on the branchlets, greenish-yellow or straw-colored, about 1 cm long. Fruit globose or depressed-globose, yellowish, 4 to 6 cm in diameter, the pericarp thick, the seeds large and surrounded by a soft, translucent or pale, edible, acid pulp. (Fl. Filip. *pl. 127.*)

Commonly cultivated, fl. Feb.–March; throughout the Philippines, wild and cultivated, undoubtedly introduced. India to Malaya.

3. AGLAIA Loureiro

Shrubs or trees with pinnate, rarely 3-foliolate or simple leaves, glabrous, lepidote, or stellate-pubescent; leaflets entire. Flowers small, globose, polygamo-dioecious, numerous, in axillary or terminal panicles. Calyx 5-lobed or toothed. Petals 5, concave, imbricate. Staminal-tube urceolate, subglobose, or obovoid, entire or 5-toothed. Anthers 5, included or half-exserted, or in one section inserted on the rim of the tube. Ovary 1- to 3-celled, small. Fruit berry-like, 1- or 2-celled and -seeded, the seeds usually surrounded by a gelatinous, fleshy integument. (Greek "splendor," from the beauty of the original species.)

Species 100 or more, India to China through Malaya to Australia and Polynesia, about 40 in the Philippines.

* 1. A. ODORATA Lour. Cinnamomo de China (Sp.-Fil.).

A small, much-branched, glabrous tree 4 to 7 m high. Leaves 5 to 12 cm long, the rachis slightly winged, leaflets 5, obovate to oblong, obtuse, 2 to 7 cm long, the lower ones smaller than the upper. Panicles axillary, 5 to 10 cm long, rather lax. Flowers numerous, yellow, very fragrant, about 3 mm in diameter, racemosely arranged. Fruit ovoid or subglobose, about 12 mm long. (Fl. Filip. *pl. 410.*)

Commonly cultivated for its fragrant flowers, but not spontaneous, fl. Aug.–Dec. A native of southeastern Asia, now more or less cultivated in many tropical countries.

4. LANSIUM Jack

Trees with odd-pinnate leaves. Flowers small, subglobose, polygamo-dioecious, the males often panicled, the females in axillary or cauline spikes or racemes. Sepals and petals 5, rounded, imbricate. Stamens united in a tube; anthers 10, included, mostly in 2 series. Ovary 3- to 5-celled; cells 2-ovuled. Fruit fleshy, 3- to 5-celled, with 1 or 2 seeds surrounded by a soft, fleshy pulp. (From its Malay name.)

Species 5 or 6, India to Malaya, 2 in the Philippines.

*1. L. DOMESTICUM Jack. Lansones (Tag.).

A tree 4 to 8 m high or more, slightly pubescent or nearly glabrous. Leaves alternate, 20 to 40 cm long; leaflets 5 to 7, oblong or elliptic-oblong, acuminate, 7 to 18 cm long, the nerves prominent on the lower surface. Perfect flowers in spikes which are solitary or fasicled on the trunk and larger branches, much shorter than the leaves. Flowers sessile, small. Fruit edible, oblong-ovate or ellipsoid, pubescent, usually about 3 cm long, the pericarp tough. Seeds 1 or 2, surrounded by translucent pulp, as are the remaining 3 or 4 aborted seeds. (Fl. Filip. *pl. 117.*)

Rarely cultivated in our area, fl. June; widely distributed in the Philippines in cultivation, certainly introduced. Malay Peninsula and Archipelago.

5. DYSOXYLUM Blume

Trees with pinnate, often much elongated leaves, the leaflets entire, often oblique at the base. Flowers elongated, perfect, paniculate. Calyx 4- or 5-fid, dentate, or subentire. Petals 4 or 5, oblong, valvate or only slightly imbricate. Staminal-tube cylindric; anthers short, 6 to 10, usually included. Disk tubular, equaling or longer than the ovary. Ovary 3- or 4-celled; style about as long as the staminal-tube. Capsule usually globose, the pericarp coriaceous, 1- to 4-celled, loculicidal. (Greek "bad" and "wood," from the ill-smelling wood of some species.)

Species 100 or more, India to Malaya, few in Australia and New Zealand, 17 in the Philippines.

1. **D. decandrum** (Blanco) Merr. Iguio (Tag.).

A tree 10 to 20 m in height. Leaves crowded at the ends of the branches, 60 to 90 cm long. Leaflets 10 or more pairs, thin when dry, the lower ones usually ovate and less than 10 cm long, the median and upper ones oblong, 20 cm long or more, base inequilateral. Panicles axillary, drooping, about 40 cm long. Flowers sessile, pale-yellowish, pubescent, about 1 cm long, 5-merous. Capsule depressed-globose, 1.5 to 2 cm in diameter, pericarp yellow, pubescent. Seeds red.

Occasionally cultivated, fl. May–July; widely distributed in the Philippines. Java to New Guinea.

6. MELIA Linnaeus

Trees with pinnate or 2- or 3-pinnate leaves, the leaflets toothed. Panicles axillary. Calyx short, 5- or 6-lobed. Petals 5 or 6, free, spreading. Staminal-tube cylindric 10- or 12-striate and toothed; anthers 10 or 12, inserted near the apex. Disk annular. Ovary 3- to 6-celled; style nearly as long as the tube. Fruit drupe-like. (Greek name of the ash, applied here on account of the resemblance of the leaves.)

A small genus of the Indo-Malayan region, 2 species in the Philippines, the following introduced.

Leaflets prominently toothed.. 1. *M. azedarach*
Leaflets entire or only slightly crenate.. 2. *M. candollei*

* 1. M. AZEDARACH L. Paraiso (Sp.-Fil.).

A shrub or small tree, usually not more than 3 or 4 m in height. Leaves bipinnate, occasionally tripinnate, 20 to 40 cm long; leaflets numerous, oblong-ovate, toothed, acuminate, 4 to 7 cm long. Panicles 10 to 20 cm long. Flowers fragrant, 5-merous, the petals about 1 cm long, oblong-spatulate, pale-lilac, the staminal-tube usually dark-purple, about 7 mm long. Fruit ovoid or subglobose, about 1 cm long.

Frequently cultivated for its fragrant and ornamental flowers, fl. all the year. A native of tropical Asia, now cultivated in most tropical countries.

2. **M. candollei** Juss. Gango (Tag.); Bagalñga (Vis.).

A tree 6 to 15 m high, glabrous when mature, the younger parts tomentose-farinose. Leaves long-petioled, about 50 cm long, usually bipinnate. Leaflets numerous, ovate to ovate-lanceolate, acuminate, entire or obscurely crenate, 4 to 8 cm long. Panicles in the upper axils, shorter than the leaves, many-flowered. Flowers violet and white, fragrant, about 8 mm long, the petals pubescent. Fruit drupaceous, ellipsoid, about 1.5 cm long. (Fl. Filip. *pl. 420.*)

Occasionally cultivated, Singalon, etc., fl. March; widely distributed in the Philippines. Timor.

73. MALPIGHIACEAE (MALPIGHIA FAMILY)

Shrubs, trees, or woody vines. Leaves opposite, entire, glandular at the base or on the petioles. Inflorescence axillary or terminal, racemose, the pedicels jointed. Flowers perfect, regular or irregular. Calyx 5-partite, one or more lobes furnished with a large gland, or eglandular. Petals 5, clawed or not. Stamens 10, equal, or one much larger than the others; filaments free or connate below. Ovary 3-celled; styles 1 to 3; ovules solitary in each cell. Fruit capsular or of variously winged samaras.

Genera 55, species about 650, widely distributed in the tropics, but chiefly American, 5 genera and about 15 species in the Philippines.

An erect shrub; fruit not winged; cultivated only........................ 1. *Galphimia*
A scandent woody vine; fruit radiately several-winged........ 2. *Tristellateia*

1. GALPHIMIA Cavanilles

Shrubs with small, opposite, mostly entire leaves, usually more or less glaucous beneath, glandular on the margins near the base or at the apex of the petioles. Inflorescence terminal, racemose, the pedicels 2-bracteolate. Flowers yellow. Calyx 5-partite, usually eglandular. Petals subequal, glabrous, clawed. Stamens 10, all perfect, the filaments distinct or united at the base. Ovary 3-celled; styles 3. Capsule of 3 indehiscent cocci. (Anagram of *Malpighia,* another genus of the family.)

Species 11, all in tropical America, a single introduced and cultivated one in the Philippines.

1. **G. GLAUCA** Cav. Cuisia (Tag.).

A shrub 1 to 3 m high, glabrous, the branches slender, brownish. Leaves opposite, oblong or elliptic-oblong, petioled, 1.5 to 5 cm long, 0.8 to 1.8 cm wide, acute. Flowers in terminal racemes, yellow, about 1.5 cm in diameter, their pedicels 1 cm long or less. Carpels small.

Occasionally cultivated for ornamental purposes, not spontaneous, fl. all the year. A native of tropical America.

2. TRISTELLATEIA Thouars

Scandent woody shrubs. Leaves opposite or whorled, the petioles with 1 or 2 glands at the top. Flowers yellow, in terminal or lateral racemes. Calyx 5-partite. Petals 5, clawed. Stamens 10, all perfect. Filaments truncate and jointed at the top. Ovary 3-lobed; styles 1 to 3, slender, one or more reduced to small papillae. Ripe carpels 3, each with 3 or more wings, more or less united, the whole forming a stellate fruit. (Latin "three" and "star," referring to the star-like wings of the 3 carpels.)

Species about 16, almost all in Madagascar, the following widely distributed in Malaya and the only Philippine representative.

1. **T. australasiae** Rich. Bagnit (Tag.).

A glabrous, scandent, woody vine several meters in length. Leaves oblong-ovate, acute, base rounded, 5 to 14 cm long, the petioles with 1 or 2 glands at the apex. Racemes terminal, 5 to 15 long. Flowers yellow, about 2 cm in diameter, the pedicels 1.5 to 3 cm long, opposite, with 2 small bracteoles below the middle. Petals oblong or oblong-ovate, base cordate, the claw slender. Fruit subglobose, about 12 mm in diameter, the carpel-wings 6 or 7, vertically compressed, spreading and recurved, linear-oblong. (Fl. Filip. *pl. 435.*)

In thickets near the seashore and along tidal streams, Tondo to Caloocan, fl. most of the year; widely distributed in the Philippines along the seashore. Malay Peninsula and Archipelago to Australia.

74. POLYGALACEAE (MILKWORT FAMILY)

Annual or perennial herbs, scandent shrubs, or trees. Leaves alternate, entire, simple. Flowers perfect, irregular, 3-bracteate. Sepals 5, unequal, the inner 2 often petal-like. Petals 5 or 3, distinct, unequal, the lower one usually boat-shaped or keeled. Stamens 4 to 8, hypogynous, the filaments united into a sheath, rarely free. Ovary free, 1- to 3-celled; ovules 1 or more in each cell. Fruit generally a 2-celled, 2-seeded capsule, dehiscent or indehiscent.

Genera 11, species about 720 of very wide distribution, 5 genera, and 19 species in the Philippines.

Inner sepals larger than the outer ones and petal-like; anthers 8 1. *Polygala*

Sepals nearly equal; anthers 4 or 5; flowers minute, in terminal spikes. 2. *Salomonia*

1. POLYGALA Linnaeus

Erect, simple or branched, often slender herbs, rarely under-shrubs. Leaves alternate, rarely whorled, simple, entire, exstipulate. Flowers in terminal or axillary, short or elongated spikes or racemes. Sepals usually persistent, unequal, the 2 inner ones large and petal-like. Petals 3, united below with the staminal sheath, the lower one keel-shaped and usually crested. Stamens 8, the filaments united for the lower one-half into a sheath that is split down one side. Ovary 2-celled; ovules solitary. Capsule 2-celled, 2-seeded, small, loculicidal. (Greek "much" and "milk," the name applied by Dioscorides to a plant that was supposed to increase the secretion of milk.)

Species more than 400 in all parts of the world, about 7 in the Philippines.

1. P. CHINENSIS L.

A slender, erect, simple or sparingly branched, slightly pubescent, annual herb 6 to 20 cm high. Leaves alternate, linear-oblong to oblong-lanceolate, apex acute, apiculate, base acute, short-petioled, 1 to 3 cm long. Racemes axillary, solitary, few-flowered, much shorter than the leaves. Flowers horizontal or pendulous, about 5 mm long, the outer 3 sepals oblong-ovate, about 1.5 mm long, the inner two as long as the corolla, falcate, much longer than the compressed, oblong-ovate, retuse capsule.

In open grass lands, near La Loma; of local occurrence in the Philippines, undoubtedly introduced. India to China, through Malaya to tropical Australia.

2. SALOMONIA Loureiro

Erect, branched, slender, annual, leafy herbs. Flowers small, in dense terminal spikes. Sepals nearly equal, the 2 interior ones somewhat larger. Petals 3, un~~ited~~ at the base with the staminal-tube, the lower one keeled, vaulted, not crested. Stamens 4 or 5, filaments united below into a sheath. Ovary 2-celled. Capsule laterally compressed, loculicidal, the margins toothed. (Commemorating the Hebrew king, Solomon.)

Species about 6, tropical Asia through Malaya to Australia, 1 in the Philippines.

1. S. CILIATA (L.) DC. (*S. oblongifolia* DC.).

A slender, erect, simple or branched, annual herb 8 to 30 cm high, nearly glabrous. Leaves elliptic to ovate-lanceolate, acute or acuminate, sessile, base rounded, 6 to 12 mm long, margins with few, long, distant hairs. Spikes slender, terminal, 2 to 8 cm long. Sepals green, nearly equal, lanceolate, acuminate, 1 to 1.2 mm long. Corolla pink-purple, about 2.5 mm long. Capsule 2 to 2.5 mm wide, broader than long, compressed, valves with a pectinate row of greenish or reddish teeth on the margins.

In open grass lands, Caloocan and La Loma, fl. Oct.–Jan.; widely distributed in the Philippines, undoubtedly introduced. India to China, southward through Malaya to Australia.

75. EUPHORBIACEAE (EUPHORBIA OR LUMBANG FAMILY)

Herbs, shrubs, or trees, rarely vines, often with milky juice. Leaves alternate or opposite, entire or toothed, sometimes deeply lobed, rarely compound (*Bischofia*), or wanting. Inflorescence various. Flowers mostly small, always unisexual, monoecious or dioecious. Perianth simple, calyx-like, often wanting in one or both sexes, sometimes with the inner series of 4 or 5 small petals, or in *Euphorbia* entirely wanting, the solitary pistil surrounded by few to many naked stamens, all enclosed in a perianth-like involucre. Stamens few to many, the filaments free or variously united. Ovary superior, 1- to many-celled, usually of 3, rarely fewer or more, more or less united carpels; styles as many as the carpels, free or united, entire or variously divided; ovules 1 or 2 in each cell. Fruit a capsule composed of 2-valved, 1- or 2-seeded cocci separating from the central axis, or drupe-like, the stone 1- to 4-celled, berry-like, or nut-like.

Genera 250, species about 4,500, in all parts of the world, chiefly tropical, 52 genera and about 300 species in the Philippines.

1. Cells of the ovary 2-ovuled.
    2. Perianth none; female flowers solitary, surrounded by numerous male flowers, each consisting of a solitary stamen, all enclosed in a perianth-like involucre; plants with abundant milky juice.. 1. *Euphorbia*
    2. Perianth present; flowers not enclosed by involucres.
        3. Petals present; fruit a drupe.. 2. *Bridelia*
        3. Petals none.
            4. Leaves simple or compound.
                5. Flowers axillary, solitary or fascicled; leaves simple.
                    6. Fruit dry, capsular, of 3 to many, dehiscent cocci.
                        7. Herbs; disk present in flowers of both sexes. 3. *Phyllanthus*
                        7. Shrubs or trees; disk none.. 4. *Glochidion*

      6. Fruit a berry........ 3. *Phyllanthus*
      6. Fruit of 3 to 6 cocci enclosed in a fleshy pericarp.
        7. Calyx truncate or minutely toothed, enlarged in fruit. 5. *Breynia*
        7. Calyx deeply 5-lobed, not enlarged in fruit........ 6. *Fluggea*
    5. Flowers in axillary or terminal spikes; fruit a small drupe, endocarp 1-celled........ 7. *Antidesma*
    5. Flowers in elongated racemes which are fascicled on the branches below the leaves; fruit a drupe, the endocarp 3- or 4-celled. 8. *Cicca*
  4. Leaves digitately compound, 3-foliolate; flowers panicled. 9. *Bischofia*

1. Cells of the ovary 1-ovuled.
  2. Petals present.
    3. Flowers in terminal or axillary cymes or panicles.
      4. Shrubs or suffrutescent herbs; monoecious........ 10. *Jatropha*
      4. Trees; dioecious........ 11. *Aleurites*
    3. Flowers in axillary racemes.
      4. Glabrous; calyx-lobes imbricate........ 12. *Codiaeum*
      4. Stellate-tomentose; calyx-lobes valvate........ 13. *Sumbavia*
  2. Petals wanting.
    3. Styles very long-fimbriate or lacerate; flowers in long spikes, the females often with numerous large bracts........ 14. *Acalypha*
    3. Styles not fimbriate.
      4. Leaves 3-foliolate........ 15. *Hevea*
      4. Leaves simple.
        5. Stamens numerous.
          6. Filaments free.
            7. Anthers 2-celled........ 16. *Mallotus*
            7. Anthers 3- or 4-celled........ 17. *Macaranga*
          6. Filaments variously united in bundles.
            7. Flowers in axillary spikes; leaves narrow, entire. 18. *Homonoia*
            7. Flowers in terminal panicles or racemes; leaves large, deeply palmately lobed........ 19. *Ricinus*
        5. Stamens 10, in 2 rows; flowers racemose or paniculate; leaves deeply lobed........ 20. *Manihot*
        5. Stamens 8; flowers small; the males in dense spikes; leaves toothed........ 21. *Alchornea*
        5. Stamens 3; flowers small; leaves entire; shrubs with abundant milky sap........ 22. *Excoecaria*

1. EUPHORBIA Linnaeus

Annual or perennial spreading or erect herbs or shrubs, with milky juice, sometimes fleshy and cactus-like. Inflorescence of many male and one female flower in a small, 4- or 5-lobed, turbinate or campanulate, perianth-like involucre, the lobes with thick glands at the sinuses, the glands often with a petal-like, spreading, white or colored limb, the involucres fascicled or cymose. Male flower a pedicelled stamen without floral envelopes. Female flowers a pedicelled, 3-celled, 3-ovuled ovary in the center of the involucre, also without floral envelopes; styles 3, free or united, simple or 2-fid. Capsule of 3, 2-valved, dehiscent cocci, separating elastically from the columella. (Named after Euphorbus, physician to King Juba.)

Species about 600, in all parts of the world, about 10 in the Philippines.

1. Erect branched shrubs or undershrubs with stout, often fleshy branches, armed with stipular spines.
  2. Very coarse, the branches very stout, 4- or 5-angled, the spines less than 4 mm long, from thickened bases; leaves 5 to 30 cm long. .... 1. *E. trigona*
  2. Branches less than 1 cm thick, the spines 4 to 12 mm long; lobes of the involucre red, showy .... 2. *E. splendens*
1. Erect unarmed shrubs with slender cylindric branches which are green and nearly leafless .... 3. *E. tirucalli*
1. Erect, unarmed, leafy shrubs or herbs, with terminal cymes subtended by showy colored bracts or bract-like leaves.
  2. Herbaceous or suffrutescent; leaves 3 to 10 cm long, irregularly lobed, the bracts green and red .... 4. *E. heterophylla*
  2. An erect shrub; leaves 10 to 18 cm long, the bracts large, uniformly bright-red .... 5. *E. pulcherrima*
1. Erect, spreading, or prostrate, unarmed herbs, the flowers in axillary cymes or fascicles.
  2. Erect glabrous herbs with rather lax cymes, the limb of the involucral-gland white, small but conspicuous.
    3. Leaves linear, 1.5 to 6 cm long, serrulate .... 6. *E. serrulata*
    3. Leaves elliptic to oblong, somewhat oblique, 1 to 1.5 cm long, very minutely toothed .... 7. *E. hypericifolia*
  2. Prostrate or spreading plants with short, densely flowered cymes or fascicles, the limb of the involucral gland none or inconspicuous.
    3. Leaves 1 to 2 cm long; plants prominently hirsute or hispid-pubescent .... 8. *E. hirta*
    3. Leaves less than 1 cm long; slender, nearly glabrous or only slightly pubescent plants.
      4. Capsules pubescent .... 9. *E. thymifolia*
      4. Capsules hispid-ciliate on the keels of the cocci, otherwise glabrous. .... 10. *E. prostrata*

1. **E. trigona** Haw. Sorog-sorog (Tag.); Suda-suda (Vis.).

A shrubby, erect, branched, fleshy, cactus-like plant 2 to 4 m high, the trunk and older branches grayish, cylindric, the medium branches slightly twisted, stout, fleshy, 4- or 5-angled or winged, the younger ones usually 3-winged, the wings lobulate, with a pair of stout, sharp, 2 to 4 mm long spines from thickened bases at each leaf or petiole-scar. Leaves from the sides of wings toward the ends of the branches, fleshy, oblong-obovate, obtuse or acute, 5 to 15 cm long, or in young plants somewhat longer. Cymes short, solitary in the sinuses, usually of 3 involucres, the involucres green or pale-yellow, about 6 mm in diameter, the lobes fimbriate.

Occasionally cultivated for ornamental purposes, fl. March; widely distributed in the Philippines in cultivation, and in some provinces apparently indigenous. India to Malaya.

* 2. E. SPLENDENS Boj. Corona de espinas (Sp.); Crown of Thorns.

An erect branched shrub 1 m high or less, the branches grayish, cylindric or obscurely angled, armed with slender, sharp, spreading, 4 to 12 mm long spines. Leaves few, alternate, oblong-obovate, obtuse or apiculate-acuminate, entire, 1.5 to 5 cm long. Inflorescence from the uppermost axils, peduncled, forked or twice forked, each peduncle with 2 to 4 involucres, each involucre with 2, spreading, red, reniform lobes about 8 mm long and 10 to 12 mm wide. (Fl. Filip. *pl. 167*, left hand figure.)

Not uncommon in cultivation, fl. all the year. A native of Madagascar, now widely cultivated as an ornamental plant.

3. E. **TIRUCALLI** L. Consuelda (Sp.-Fil.).

An erect, glabrous, unarmed shrub or small tree 2 to 5 m high, the branches green, somewhat fleshy, cylindric, clustered or scattered, the ultimate ones about 5 mm thick. Leaves none, or few and scattered, linear-oblong, 1 cm long or less. Involucres shortly pedicelled, clustered in the forks of the smaller branches, small, turbinate. (Fl. Filip. *pl. 210.*)

In thickets and hedges, Malabon; of rather wide distribution in the Philippines, but certainly introduced. A native of Africa, now naturalized in many parts of India.

4. E. **HETEROPHYLLA** L. Painted Leaf.

An erect, branched, glabrous or nearly glabrous, suffrutescent herb or shrubby plant 0.5 to 1.5 m high. Leaves alternate, very variable, mostly oblong-ovate, acute, 3 to 10 cm long, the lower ones usually entire, the upper ones variously lobed, sinuate, dentate, or subentire, the uppermost ones often blotched with red at the base, similar to the bracts. Bracts leaf-like, but much smaller than the leaves, the lower part red, the upper part green. Involucres clustered at the ends of the branches, about 3 mm long, green, one sinus bearing an unappendaged gland. Capsules nodding, about 5 mm wide.

Frequently cultivated for ornamental purposes, also spontaneous in vacant lots, etc., fl. all the year. A native of temperate and tropical America, of comparatively recent introduction here.

*5. E. **PULCHERRIMA** Willd. Pascuas (Sp.-Fil.); Poinsettia.

An erect, sparingly and laxly branched shrub 2 to 4 m high. Leaves elliptic to oblong-elliptic or the upper ones lanceolate, acute or acuminate, 10 to 18 cm long, the lower ones all green, obscurely repand or slightly lobed, long-petioled, slightly pubescent beneath, the upper ones, at time of flowering, uniformly bright-red. Inflorescence terminal. Involucres ovoid, about 1 cm long, the margins toothed, each with one or two large, yellow glands. Flowers crowded, red. (Fl. Filip. *pl. 167*, right hand figure.)

Cultivated for ornamental purposes, fl. Oct.–Feb., very showy at time of flowering, the upper leaves then being bright-red. A native of tropical America, now cultivated in most tropical and subtropical countries.

6. **E. serrulata** Reinw.

A slender, erect, glabrous, simple or branched, somewhat suffrutescent and wiry plant 25 to 70 cm high, the stems terete. Leaves opposite, linear to oblong-linear, 1.5 to 6 cm long, obtuse or apiculate, base rounded, margins remotely serrulate. Cymes small, axillary and terminal, the heads small, pedicelled, 5 to 9 in each cyme, the involucre purplish, ovoid, nearly 2 mm long, each with about 4, white, petal-like, orbicular or reniform appendages, 1 to 1.5 mm wide. Styles short, bifid. Capsules ovoid, about 2 mm long.

In open grass lands, Caloocan to San Pedro Macati, fl. Aug.–Dec.; widely distributed in the Philippines. Southern China and Formosa to Celebes and Timor.

7. E. HYPERICIFOLIA L.

An annual, erect, branched, glabrous, plant 20 to 60 m high; the branches slender, often purplish. Leaves shortly petioled, thin, oblong, 1 to 2.5 cm long, somewhat oblique, obtuse, base broad, rounded or cordate, margins serrulate. Involucres about 1 mm long, in axillary and terminal, leafy, many-flowered cymes, greenish, the glands small, the lobes white or pink, very small. Capsule trigonous, ovoid, about 1.5 mm long, nodding.

In open grass lands, Caloocan, La Loma, etc., fl. Dec.–Apr.; of local occurrence in the Philippines and undoubtedly introduced here. Tropics generally.

8. E. HIRTA L. (*E. pilulifera* L.). Batobatonis, Bucasbucas (Tag.); Golandrina (Sp.–Fil.).

An annual, hispid-pubescent herb usually much-branched from the base, the branches ascending or spreading, up to 40 cm long, simple or forked, often reddish or purplish. Leaves opposite, distichous, elliptic-oblong to oblong-lanceolate, oblique, serrulate, acute, usually blotched with purple in the middle, 1 to 2.5 cm long. Involucres greenish or purplish, about 1 mm long, very numerous, in dense, axillary, sessile or short-stalked clusters or crowded cymes. Capsules broadly ovoid, 1.5 mm long or less, hairy, 3-angled.

In open waste places, abundant, fl. all the year; throughout the Philippines, but certainly introduced. Tropics generally.

9. E. THYMIFOLIA Burm.

An annual, spreading or prostrate, much-branched, slender, glabrous or somewhat pubescent herb, the stems usually reddish, up to 20 cm in length. Leaves opposite, distichous, somewhat oblique, elliptic to oblong, obtuse, obscurely crenulate, 4 to 7 mm long. Involucres about 1 mm long, purplish, in the axils of much reduced leaves or bracts on crowded short branchlets from the leaf-axils. Capsules pubescent, 3-angled, about 1.5 mm long.

In open waste places, roadsides, etc., fl. all the year; common and widely distributed in and about towns in the Philippines and certainly introduced. Tropics generally.

10. E. PROSTRATA Ait.

A slender, prostrate or spreading, branched, nearly glabrous annual herb, the stems usually less than 15 cm in length, usually pubescent along one side. Leaves small, short-petioled, elliptic to obovate, rounded, base inequilateral, margins sharply toothed, 5 to 8 mm long. Involucres axillary, pedicelled, intermixed with reduced leaves. Capsules glabrous except for the hispid-ciliate keels of the cocci. Similar in appearance to the preceding species.

In waste places, not common, fl. all the year. A native of tropical America, now widely distributed in the tropics.

2. BRIDELIA Willdenow

Shrubs or trees with alternate, entire leaves. Flowers small, monoecious or dioecious, in axillary fascicles, sessile or shortly pedicelled, bracteate. Calyx usually 5-cleft, the lobes valvate. Petals much smaller than the calyx-lobes. Disk broad, in the male flowers cushion-like or adnate to the calyx-tube, in the female flowers often enclosing the ovary. Stamens 5; filaments united below in a column which bears the rudimentary ovary, free above, spreading. Ovary 2- or 3-celled; styles usually 2, forked; ovules 2 in each cell. Fruit drupe-like, with often scanty flesh and 1 or 2 1-seeded cocci or pyrenes. (In honor of S. E. Bridel, a bryologist.)

Species 30, tropical Asia and Africa through Malaya to Australia, 2 or 3 in the Philippines.

1. **B. stipularis** (L.) Blume. Lubálub (Tag.).

A scandent shrub, or suberect with scandent or dropping branches, reaching a height of 6 m, rather densely pubescent. Leaves elliptic to elliptic-ovate, acute or obtuse, base rounded or subcordate, 4 to 10 cm long, pale beneath. Flowers axillary, clustered, pale-green, about 1 cm in diameter, with few, scattered, purplish dots, the males sessile, the females pedicelled. Fruits about 1 cm long, oblong, seated on the enlarged calyx.

In thickets, San Pedro Macati, etc., fl. Oct.–Nov.; widely distributed and common in the Philippines. Tropical Asia, Africa, and Malaya.

3. PHYLLANTHUS Linnaeus[1]

Herbs or shrubs with 2-ranked, alternate, entire, often small leaves. Flowers small, monoecious, apetalous, in axillary clusters. Disk various, rarely none. Male flowers: Sepals 4 to 6, imbricate in 2 series. Disk-glands various. Stamens 3 to 5 in the center of the flower, the filaments free or united; anthers oblong, the cells parallel or diverging, the slits vertical or transverse. Female flowers: Sepals as in the male. Ovary 3-celled or more; styles free or connate, usually 2-fid; ovules 2 in each cell. Fruit of 3 or more, crustaceous, 2-valved cocci, or fleshy and berry-like. (Greek "leaf" and "flower" from the fact that in the typical American forms the flowers are borne on the leaves.)

Species about 400, in all warm countries, 20 in the Philippines.

1. Shrubs with fleshy berry-like fruit.. 1. *P. reticulatus*
1. Herbs with dehiscent capsules.
    2. Anthers dehiscing vertically; flowers sessile or nearly so; capsules often muricate.. 2. *P. urinaria*
    2. Anthers dehiscing horizontally; flowers distinctly pedicelled; capsules smooth.
        3. Leaves 2 to 5 mm wide; usually much-branched plants; pedicels 1 to 2 mm long.. 3. *P. niruri*
        3. Leaves 6 to 9 mm wide; slightly or not at all branched plants; pedicels about 5 mm long.. 4. *P. simplex*

1. **P. reticulatus** Poir. Tintatintahan (from Sp. *tinta*=ink).

An erect or somewhat scandent shrub 1.5 to 5 m high, the branches elongated, often pendulous, somewhat pubescent or glabrous. Leaves distichous, oblong to elliptic-oblong, 1.5 to 4 cm long, obtuse or acute, rather pale beneath, short-petioled, base rounded or obtuse. Flowers axillary, solitary or few in each axil, slenderly pedicelled, 2 to 3 mm long, green tinged with purple. Fruit depressed-globose, soft and fleshy, smooth, black when mature, 5 to 7 mm in diameter. (Fl. Filip. *pl. 239*.)

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[1] For the Philippines species of this and allied genera (*Agyneia, Flueggea, Glochidion, Phyllanthus, Cicca, Sauropus,* and *Securinega*) see Robinson, C. B., "Philippine Phyllanthinae." *Philip. Journ. Sci.* 4 (1909) *Bot.* 71–105.

Very common in thickets, hedges, etc., fl. all the year; widely distributed in the Philippines. Tropical Africa, Asia, and Malaya.

2. P. URINARIA L.

An erect, branched, slender, glabrous or nearly glabrous herb 10 to 40 cm high, the branches angled. Leaves distichous, imbricate, alternate, pale beneath, sessile, elliptic-oblong to oblong, thin, 5 to 10 mm long, obtuse or apiculate, base slightly oblique; stipules lanceolate. Flowers very small, 5-merous, axillary, about 1 mm in diameter, sessile or very shortly pedicelled. Sepals greenish. Stamens 3; filaments united below; anthers erect, the slits vertical. Capsules about 2 mm in diameter, muricate or smooth, of 3 dehiscent cocci.

In waste places, occasional, fl. all the year; widely distributed in the Philippines, probably introduced. Tropics generally.

3. P. NIRURI L.

An erect, slender, branched, glabrous herb, 10 to 60 cm high, the branchlets distichous. Leaves distichous, often imbricate, oblong to elliptic-oblong, obtuse or rounded, very shortly petioled, rather pale beneath, 5 to 8 mm long, the stipules small, subulate. Flowers axillary, shortly pedicelled, whitish or pale-green, about 0.5 mm long, the sepals 5, oblong, green, margined with white, the pedicels distinct, 1 to 2 mm long. Anthers 3, opening by transverse slits. Capsules depressed-globose or globose, smooth, 1.5 to 2 mm in diameter.

In waste places, roadsides, etc., occasional, fl. all the year; widely distributed in the Philippines, probably introduced. Tropics generally.

4. **P. simplex** Retz.

A slender, erect, simple or slightly branched, glabrous, annual herb 20 to 50 cm high, the stems compressed, usually purplish. Leaves two-ranked, subsessile or shortly petioled, oblong-linear, acute, or obtuse, 1.5 to 3 cm long, 6 to 9 mm wide, the stipules small, acuminate. Flowers axillary, solitary, the males very small, on short pedicels, the females with pedicels 8 mm long or less. Capsules depressed-globose, 3 to 3.5 mm in diameter, smooth.

In open grass lands, scattered, fl. all the year; throughout the Philippines in the cultivated areas, possibly introduced. India to China, Malaya, and Polynesia.

4. GLOCHIDION Forster

Erect shrubs or trees, glabrous or hairy, monoecious or dioecious. Leaves alternate, 2-ranked, entire. Flowers small, in axillary clusters, apetalous, without disk-glands or scales. Male flowers: Sepals 6, rarely 5, imbricate in 2 series. Anthers 3 to 8, connate in an oblong column. Rudimentary ovary none. Female flowers: Calyx about as in the males, sometimes toothed. Ovary 3- to many-celled; styles connate in a column which is toothed or lobed at the tip; ovules 2 in each cell. Capsule globose or depressed-globose, dry or fleshy, of 3 to many 2-valved cocci, which are longitudinally lobed or ridged. (Greek "an angular end," from the style-characters.)

Species about 175, tropical Asia to Polynesia and Australia, 29 in the Philippines.

1. **G. rubrum** Blume.

A shrub or small tree 3 to 6 m high, glabrous except the sometimes slightly pubescent twigs. Leaves coriaceous, 5 to 10 cm long, shining, elliptic-ovate to oblong, base acute, apex acuminate. Flowers small, about 2.5 mm long, greenish, short-pedicelled, in axillary fascicles. Stamens 3. Ovary pubescent, globose, 3- to 5-celled, the styles united in a column about as long as the ovary. Capsule depressed-globose, glabrous, pink or red, 7 to 10 mm in diameter, crustaceous, longitudinally about 6-sulcate.

In dry thickets near Fort McKinley, La Loma, etc., fl. June–July, and probably in other months; widely distributed in the Philippines. Malaya.

5. BREYNIA Forster

Erect shrubs or small trees with alternate, often distichous, entire, simple leaves. Flowers very small, axillary, monoecious. Petals and disk none. Male flowers: Calyx turbinate or hemispheric, truncate, the rim sometimes much thickened and lobulate. Stamens 3; filaments united in a column. Rudimentary ovary none. Female flowers: Calyx hemispheric to rotate, shortly or shallowly 6-lobed, enlarged in fruit and disk-like or cupular. Staminodes none. Ovary globose, 3-celled; ovules 2 in each cell; styles 3, 2-fid or 2-lobed. Fruit fleshy, globose, indehiscent, seated on the enlarged persistent calyx. Seeds few. (In honor of J. Breyne, an early German botanist.)

Species about 15, tropical Africa through Asia and Malaya to Polynesia, 3 in the Philippines.

Leaves usually ovate; calyx distinctly increasing in size in fruit. 1. *B. cernua*

Leaves subelliptic to oval; calyx not or but very slightly increasing in size. 2. *B. rhamnoides*

1. **B. cernua** (Poir.) Muell.-Arg. Matang-olang (Tag.).

An erect glabrous shrub 1 to 6 m high, the branchlets and leaves distichous. Leaves ovate or subovate, thin, pale beneath, 2 to 5 cm long, acute or obtuse. Flowers small, axillary. Fruit globose, pink or red, about 5 mm in diameter, somewhat fleshy, seated on the green, enlarged, disk-like or saucer-shaped calyx which is often as wide or nearly as wide as the fruit.

In thickets, Pandacan, fl. most of the year; common and widely distributed in the Philippines. Timor to northern Australia.

2. **B. rhamnoides** (Retz.) Muell.-Arg. Matang-olang (Tag.).

An erect, monoecious, slender, glabrous shrub 1.5 to 4 m high, the branchlets distichous. Leaves elliptic to elliptic-ovate, distichous, obtuse or rounded, green above, pale beneath, 1 to 3 cm long. Flowers very small, greenish, axillary, short-pedicelled, about 1 mm in diameter. Fruit globose, pink, about 5 mm in diameter, somewhat fleshy, seated on the very slightly accrescent calyx.

In thickets, Pasay, San Pedro Macati, etc., fl. June–July; widely distributed in the Philippines. India to China and Malaya.

6. FLUGGEA Willdenow

Erect shrubs or small trees with small, alternate, entire, distichous leaves. Flowers small, pedicelled, dioecious, apetalous, axillary. Male flowers numerous. Sepals 5, imbricate. Stamens 3 to 5, alternating with the disk-glands; filaments free; rudimentary ovary large, 2- or 3-fid. Female flowers: Calyx as in the male. Disk annular, toothed. Ovary 1- to 3-celled; styles united below, recurved, entire or notched; ovules 2 in each cell. Fruit fleshy, globose, 3- to 6-seeded. (In honor of J. Flügge, a German physician and botanist.)

Species 6 in the tropics of the Old World, 2 in the Philippines.

1. **F. virosa** (Willd.) Baill. (*F. obovata* Wall.).

An erect glabrous shrub 2 to 4 m high, with distichous, oblong-obovate to elliptic or ovate, thin, obtuse or acute leaves, 1 to 5 cm long, which are usually pale beneath. Flowers numerous, pale-yellowish, short-pedicelled, in dense axillary fascicles, the calyx about 2 mm in diameter. Stamens usually 5, exserted, free. Fruit globose, white, 5 mm in diameter or less, 3- to 6-seeded.

In dry thickets, not uncommon, fl. May–June; widely distributed in the Philippines. Tropical Asia and Africa, through Malaya to Australia.

7. ANTIDESMA Linnaeus

Trees or shrubs with alternate, entire, stipulate leaves. Flowers small, dioecious, in slender, axillary or terminal, simple or panicled spikes or racemes, apetalous. Male flowers: Calyx 3- to 5-toothed or lobed. Disk entire or lobed. Stamens 2 to 5, exerted, inserted around the disk, the rudimentary ovary small or none, glabrous or hairy. Female flowers with the calyx as in the males, or sometimes truncate. Disk annular or cushion-like. Ovary 1-celled; stigmas 2 to 4; ovules 2. Fruit a small, ovoid to globose, fleshy, often compressed drupe, the seed compressed, rugose. (Greek "for" and "band," the bark of some species used for cordage.)

Species 65 or more in the tropics of the Old World, about 10 in the Philippines.

1. Leaves broadly elliptic, rounded at the apex................ 1. *A. ghaesembilla*
1. Leaves oblong-ovate to elliptic-ovate, acute or acuminate.
    2. Leaves 8 to 20 cm long, glabrous; fruit about 8 mm long.. 2. *A. bunius*
    2. Leaves 5 to 10 cm long, somewhat pubescent; fruit about 5 mm long. 3. *A. leptocladum*

1. **A. ghaesembilla** Gaertn. Binayoyo, Bignay-pogo (Tag.).

An erect, much-branched tree 3 to 10 m high, more or less pubescent or nearly glabrous. Leaves broadly elliptic to elliptic-oblong, 3 to 8 cm long, apex broad, usually rounded, base subcordate. Spikes pubescent, panicled, 4 to 10 cm long, the flowers small, sessile, white. Stamens 4 to 7. Fruit subglobose, olivaceous, acid, 4 to 5 mm in diameter, smooth, when dry strongly wrinkled. (Fl. Filip. *pl. 26.*)

In thickets, Masambong to Santa Mesa, Pasay, etc., fl. Mar.–May, and probably in other months; widely distributed in the Philippines. Tropical Africa, Asia, and Malaya.

2. A. BUNIUS (L.) Spreng. Bignay (Tag., Vis.).

A dioecious tree 4 to 10 m high, glabrous. Leaves oblong, acute or shortly acuminate, base usually rounded, shining, 8 to 20 cm long, the spikes axillary or terminal, simple, usually 5 to 15 cm long. Male flowers sessile, the calyx green, about 1.5 mm in diameter, shallowly lobed. Stamens 3; anthers purple. Female flowers shortly pedicelled, green. Calyx cup-shaped. Ovary glabrous. Fruit ovoid, fleshy, red, acid, edible, about 8 mm long, wrinkled when dry, the seed somewhat compressed, rugose. (Fl. Filip. *pl. 361.*)

Common, fl. March–Aug.; throughout the Philippines, introduced. India to Malaya.

3. **A. leptocladum** Tul. Bignay, Bignay-pogo (Tag.).

A shrub 1 to 4 m high, the branchlets and lower surface, of the leaves pubescent with short hairs. Leaves shining on the upper surface, oblong-ovate to elliptic-ovate, 5 to 10 cm long, 2 to 4 cm wide, base acute or rounded, apex shortly acuminate; petioles 2 to 3 mm long. Racemes slender, axillary, pubescent, 3 to 7 cm long. Flowers greenish, small, 4-merous. Fruit in rather dense cylindric racemes about 5 cm long, 1.5 cm in diameter, when fresh globose, purple, glabrous, acid, 5 mm in diameter, when dry compressed and wrinkled.

Common in thickets, fl. June–July throughout the Philippines. Endemic.

8. CICCA Linnaeus

A dioecious tree with distichous, alternate, odd-pinnate leaves crowded at the ends of the stout branches, the flowers fascicled along elongated racemes which are in turn fascicled on nodules along the branches below the leaves. Flowers small, numerous. Sepals 4, rarely 5 or 6, in both sexes. Stamens 4, filaments free; anthers oblong, erect, opening vertically. Styles 3 or 4, free. Fruit fleshy, with a 3- or 4-celled bony endocarp. (Apparently from one of its Indian names.)

A single Indo-Malayan species.

*1. C. DISTICHA L. (*Phyllanthus distichus* Muell.-Arg.). Iba (Tag.).

A small, glabrous, deciduous tree 4 to 9 m high, the branches thickened, bearing nodules in the axils of the fallen leaves. Leaves unequally pinnate, crowded at the ends of the branches, 20 to 40 cm long; leaflets alternate, entire, oblong-ovate, pointed, 2 to 7 cm long, usually about 20. Racemes fascicled, 10 to 15 cm long, fascicled on protuberances on the branches below the leaves. Flowers pink, small, crowded in many-flowered fascicles along the racemes, male and female usually on separate plants. Fruit globose, fleshy, acid, edible, greenish-white, 1 to 1.5 cm in diameter, containing a hard, bony, 6- or 8-grooved, 3- or 4-celled stone, each cell with a single seed. (Fl. Filip. *pl. 303, C. acidissima.*)

Occasionally cultivated for its edible fruits, fl. at intervals throughout the year; widely distributed in the Philippines in and about towns, of prehistoric introduction. India to Madagascar, Malaya, and Polynesia; introduced in tropical America.

9. BISCHOFIA Blume

A glabrous tree with alternate, 3-foliolate leaves, the leaflets usually crenate. Flowers small, dioecious, apetalous, in axillary panicled racemes. Male flowers scattered or clustered. Sepals 5, concave, imbricate, concealing the anthers. Disk none. Stamens 5. Rudimentary ovary short, broad. Female flowers: Sepals caducous. Staminodes 5, small, or none. Ovary 3- or 4-celled; ovules 2 in each cell. Fruit globose, fleshy, with 3 or 4 cells. Seeds oblong. (In honor of G. W. Bischoff, a German botanist.)

A monotypic genus.

1. **B. javanica** Blume (*B. trifoliata* Hook. f.). Toog (Tag.).

A glabrous tree reaching a height of 25 m. Leaves 3- foliolate, ovate to elliptic-ovate, acuminate, crenate-dentate, 8 to 15 cm long. Panicles in the upper axils, many-flowered, shorter than the leaves. Flowers small, greenish. Fruit fleshy, globose, brown or reddish, 1 to 1.5 cm in diameter. Seeds brown, oblong, 5 mm long.

Cementerio del Norte, Malate, etc., immature specimens; widely distributed in the Philippines. India, through Malaya to Polynesia.

10. JATROPHA Linnaeus

Herbs or shrubs, often glandular. Leaves alternate, entire, angled, or digitately lobed. Flowers monoecious, in terminal cymes, the central flowers of the cyme usually female. Male flowers with 5 imbricate sepals and 5 free or connate petals. Stamens usually 8 or 10, sometimes more; filaments all connate, or outer ones free. Female flowers with calyx as in the males, the petals often absent. Carpels connate in a 2- to 4-celled ovary; ovules solitary; styles connate below, 2-fid above. Fruit a dehiscent capsule of two to four 2-valved cocci. Seed ovoid or oblong, albumen fleshy. (Greek "physician" and "food," from medicinal qualities.)

Species about 160 in the tropics of both hemispheres, chiefly in Africa and America, 4 introduced in the Philippines.

1. Leaves peltate; stems much swollen and thickened at the base. 1. *J. podagrica*
1. Leaves not peltate.
    2. Leaves palmately divided into about 10 lanceolate lobes.. 2. *J. multifida*
    2. Leaves 3- to 5-lobed or angled, or subentire.
        3. Plant glabrous........ 3. *J. curcas*
        3. Plant with numerous capitate-glandular hairs........ 4. *J. gossypifolia*

*1. J. PODAGRICA Hook.

Stems erect, simple or sparingly branched, much thickened and fleshy below, 0.5 to 1.5 m high, the petiole-scars large, the stipules dissected, glandular. Leaves peltate, orbicular-ovate, 10 to 25 cm long, 3- to 5-lobed, base truncate or rounded, the lower surface glaucous, the petioles as long as the leaves. Cymes terminal, long-peduncled, the branches short, thick, the branchlets and flowers red. Sepals about 2 mm long, connate to about the middle. Petals about 7 mm long, oblong-obovate. Capsules ellipsoid, 1.3 to 1.8 cm long.

Rarely cultivated and of very recent introduction, fl. all the year. A native of Central America.

*2. J. MULTIFIDA L. Maná (Sp.-Fil.).

A glabrous shrub 2 to 3 m high, the petioles about as long as the leaves. Leaves glaucous beneath, 15 to 30 cm in diameter, cleft nearly to the base into about 10 lanceolate, acuminate, entire or pinnately incised lobes, the lobes 1 to 4 cm wide; stipules 1 to 2 cm long, setaceous-dissected. Cymes long-peduncled, 3 to 6 cm broad. Flowers red, 5 to 6 mm long. Capsule obovoid somewhat 3-angled, the angles rounded, about 2 cm long. (Fl. Filip. *pl. 342.*)

Occasionally cultivated, fl. most of the year. A native of tropical America, introduced here at an early date, but not spontaneous.

3. J. CURCAS L. Tuba (Tag.); Physic Nut.

A glabrous, erect, branched shrub 2 to 5 m high. Branches stout, cylindric, green. Leaves orbicular-ovate, angular or somewhat 3- or 5-lobed, 10 to 18 cm long, acuminate, base cordate, the petioles long. Cymes axillary, peduncled, the flowers greenish or greenish-white, 7 to 8 mm in diameter, the staminate ones villous inside, the petals reflexed. Stamens 10, the filaments of the inner 5, connate. Capsule at first fleshy, becoming dry, of 3 or 2 cocci, 3 to 4 cm long. (Fl. Filip. *pl. 384.*)

In thickets and hedges along roadsides etc., common, fl. all the year; throughout the Philippines, thoroughly naturalized. A native of tropical America, now widely distributed in the tropics.

4. J. GOSSYPIFOLIA L. Tubang-morado (Tag.).

An erect, branched, shrubby plant usually less than 1 m high, the petioles, margins of the leaves, and the inflorescence with numerous, capitate-glandular hairs. Leaves palmately 3- or 5-lobed, shining, glabrous, 7 to 12 cm long, the lobes oblong-ovate, the younger leaves purplish, the petioles about as long as the leaf-blades. Cymes peduncled. Flowers purple, small. Capsules usually 3-lobed, about 1 cm long.

In gardens etc., occasionally spontaneous, fl. July–Sept., and probably in other months. A native of tropical America, of comparatively recent introduction here.

11. ALEURITES Forster

Trees with simple, entire or lobed, alternate, long-petioled, ample leaves, the petioles 2-glandular at the top. Flower monoecious, in lax, terminal, panicled cymes. Male flowers: Calyx subglobose, bursting into 2 or 3 valvate lobes. Petals 5. Stamens 8 to 20 on a conical receptacle, the 5 outer ones opposite the petals, alternating with small glands. Rudimentary ovary none. Female flowers: Perianth as in the male. Disk obscure or of glands. Ovary 2- to 5-celled; styles 2-armed; ovules 1 in each cell. Fruit rather large, drupaceous or capsular, the pericarp hard or crustaceous, 1- to 3-celled, seeds 1 to 3, large. (Greek "meal," from indumentum of one species.)

Species 4, southern Asia to Polynesia, 2 in the Philippines.

Stamens 15 to 20, inserted in 4 rows; ovary 2-celled; fruit 1- or 2-seeded. 1. *A. moluccana*

Stamens 7 to 10, in 2 rows; ovary 3- or 4-celled; fruit usually 3-seeded. 2. *A. trisperma*

1. **A. moluccana** (L.) Willd. Lumbang, Lumbang-bato (Tag.); Biao (Vis.); Candle Nut.

A large tree, the younger parts and inflorescence pubescent. Leaves long-petioled, ovate to lanceolate, 10 to 20 cm long, acuminate, base acute, truncate, or cordate, the margins entire or 3- to 5-lobed. Panicles 10 to 15 cm long, pubescent, many-flowered. Flowers 6 to 8 mm long, the petals obovate-lanceolate. Fruit fleshy, ovoid, 5 to 6 cm long, glabrous, olivaceous, containing 1 or 2, hard-shelled, oily seeds. (Fl. Filip. *pl. 220.*)

Cementerio del Norte, immature specimens. Common and widely distributed in the Philippines, a native of Malaya and Polynesia, now planted in most tropical countries.

2. **A. trisperma** Blanco. Banucalad, Baguilumbang (Tag.).

A tree 10 to 15 m high or more, glabrous except the inflorescence. Leaves suborbicular to broadly ovate, 10 to 20 cm long, entire, base broadly cordate. Panicles about 15 cm long, densely pubescent. Flowers 10 to 12 mm in diameter, the petals obovate, outside densely pubescent. Stamens about 8, inserted in 2 rows. Ovary 3- or 4-celled. Fruit 5 to 6 cm in diameter, subglobose, tardily dehiscing, usually 3-celled, 3-seeded. (Fl. Filip. *pl. 296.*)

Immature specimens, Cementerio del Norte, fl. in regions near Manila Jan.–March; widely distributed in the Philippines. Endemic.

12. CODIAEUM Jussieu

Erect, branched, glabrous shrubs with alternate, entire or lobed, often variegated leaves. Flowers monoecious, in unisexual, axillary racemes, sometimes a female flower at the base of the male racemes. Male flowers white, fascicled, pedicelled. Calyx-lobes 3 to 6, thin, imbricate. Petals much smaller than the sepals, alternate with the disk-glands. Stamens 15 to 30, free. Female flowers solitary, the calyx 5-lobed. Petals none. Ovary 3-celled, cells 1-ovuled; styles slender, entire. Capsule globose, of three 2-valved cocci. (From the Malayan name.)

Species about 7 in Malaya, Australia, and Polynesia, 4 in the Philippines.

***1. C. VARIEGATUM** (L.) Blume. San Francisco, Buenavista (Sp.-Fil.); Saguilala (Tag.); Croton.

An erect, branched, glabrous shrub 1 to 2 m high, the leaves exceedingly variable in shape and color, linear to oblong, entire or sparingly lobed, flat or variously crisped, undulate, or even spiral, sometimes interrupted, 8 to 25 cm long, 6 to 10 cm wide, pale-green, green to purple, some forms spotted or mottled with yellow, others with the midrib and nerves red or purple, etc. Racemes axillary, solitary, lax, 15 to 25 cm long, the pedicels slender. Male flowers white, about 6 mm in diameter, the sepals reflexed. (Fl. Filip. *pl. 390.*)

Very common in cultivation but not spontaneous, fl. at intervals throughout the year; in towns throughout the Philippines. Probably a native of the Moluccas, now cultivated in most tropical countries. The leaves are infinitely variable in form and color, in these respects by far the most variable plant in the Archipelago.

13. SUMBAVIA Baillon

Shrubs or trees with pale, dense, stellate pubescence. Leaves alternate, broad, 3- or 5-nerved, entire or slightly toothed. Flowers monoecious, in axillary, spike-like racemes, the males subsessile, clustered, the females solitary, pedicelled, below the males. Male flowers: Calyx globose, thin, splitting into valvate lobes. Petals 4 or 5, short. Stamens many, on a convex, eglandular receptacle, filaments free. Rudimentary ovary none. Female flowers: Calyx 5- or 6-fid, the lobes narrow. Petals small or none. Ovary 3-celled; styles recurved; ovules 1 in each cell. Capsule of two or three 2-valved cocci. (From the Island of Sumbava.)

Species 3, Burma to Malaya, 1 in the Philippines.

1. S. rottleroides Baill. Quilap or Quirap (Tag.).

A shrub 2 to 3 m high, the young branches, petioles, inflorescence, and lower surfaces of the leaves densely white- or gray-stellate-pubescent. Leaves broadly ovate to orbicular-ovate, 5 to 9 cm long, the upper surface glabrous, base broad, rounded or truncate, 3- or 5-nerved, apex obtuse or very broadly blunt-acuminate, margins slightly undulate or subentire. Racemes in the upper axils, solitary, 5 to 7 cm long, the lower flowers female, the upper ones male, both sexes densely stellate-tomentose. Female flowers with a 6-cleft calyx. Capsule depressed-globose, 3-sulcate, 10 to 12 mm wide, densely stellate-pubescent. (Fl. Filip. *pl. 463, Mercadoa mandalojonensis.*)

In thickets, Masambong, fl. May. Of local occurrence in the Philippines. Malaya.

14. ACALYPHA Linnaeus

Herbs, shrubs, or trees, with alternate, toothed or crenate, 3- to 5-plinerved or penninerved leaves. Flowers very small in axillary spikes, monoecious, rarely dioecious, without petals. Male flowers very small, ebracteate. Calyx thin, splitting into 4 valvate sepals. Disk none. Stamens 8 or many, on a convex receptacle; filaments free. Rudimentary ovary none. Female flowers at the base of the male spike or more often in separate ones, often with large, accrescent leafy bracts. Sepals 3 or 4, very small. Ovary 3-celled; styles slender, often very long and laciniate or fimbriate; ovules 1 in each cell. Capsule of 3, small, crustaceous, 2-valved cocci. (From an ancient Greek name of the nettle.)

Species about 300 in tropical and subtropical regions of both hemispheres, 8 or more in the Philippines.

1. Herbs.
    2. Spikes 5 to 6 cm long; bracts distant, glabrous or nearly so. 1. *A. indica*
    2. Spikes 1 to 2 cm long, dense; bracts close, somewhat imbricate, densely pubescent........ 2. *A. boehmeroides*
1. Shrubs or undershrubs.
    2. Spikes pendulous, purple, dense, about 1 cm in diameter, up to 40 cm in length........ 3. *A. hispida*
    2. Spikes slender, 10 to 20 cm long less than 5 mm in diameter.
        4. Leaves broadly ovate, variously mottled with red and purple. 4. *A. wilkesiana*
        4. Leaves oblong-ovate to ovate-lanceolate, green...... 5. *A. stipulacea*

1. A. INDICA L.

An erect, simple or branched, somewhat appressed-pubescent, annual herb, 30 to 80 cm high. Leaves long-petioled, ovate, crenate-serrate, acute or obtuse, base acute, entire, 3 to 6 cm long, shorter than the petioles. Spikes axillary, solitary, erect, 4 to 8 cm long. Male flowers few, small, terminal. Bracts few to many, distant, green, glabrous or nearly so, 5 to 6 mm long, crenate, reniform when spread, each with 1 or more female flowers. Capsules about 2 mm long, slightly hispid. (Fl. Filip. *pl. 266.*)

In waste places, fl. all the year; widely distributed in the Philippines, undoubtedly introduced. Tropical Africa, through tropical Asia to Malaya.

2. A. BOEHMEROIDES Miq.

An erect, simple, rarely branched, annual, appressed-pubescent herb 20 to 80 cm high. Leaves 2 to 7 cm long, long-petioled, ovate to oblong-ovate, acuminate, base acute, entire, margins dentate. Spikes axillary, usually solitary, dense, 1 to 2 cm long. Male flowers few, at the apices of the spikes. Bracts numerous, crowded, somewhat imbricate, rather densely pubescent, 4 to 5 mm long, toothed, reniform when spread. Capsules much shorter than the bracts, hirsute.

In waste places, fl. all the year; of local occurrence in and about towns in the Philippines, probably introduced. Malaya.

* 3. A. HISPIDA Burm.

A shrub 0.5 to 3 m high. Leaves broadly ovate, 10 to 20 cm long, 6 to 16 cm wide, acuminate, base rounded, slightly cordate, margins rather coarsely toothed. Spikes unisexual, the pistillate ones dense, cylindric, pendulous, purple, up to 40 cm long, about 1 cm in diameter. Ovary densely villous; styles divided into many, filiform, slender, elongated branches.

Frequently cultivated for ornamental purposes, fl. all the year, introduced; probably a native of Malaya or of Polynesia. A striking ornamental on account of its dense, cylindric, pendulous purple spikes; cultivated in all tropical countries.

* 4. A. WILKESIANA Muell.-Arg. (*A. tricolor* Seem.).

An erect branched shrub 2 to 5 m high. Leaves broadly ovate, 10 to 18 cm long, 6 to 12 cm wide, acuminate, base rounded or acute, not cordate, very sparingly hairy on the nerves or quite glabrous, variously mottled with shades of red, purple, and olive, the margins distinctly and regularly toothed. Spikes purplish, slender, the staminate ones up to 20 cm long, less than 5 mm in diameter, interrupted, the flowers glomerate.

An introduced and cultivated species, very ornamental on account of its variously colored leaves, fl. all the year. A native of the Fiji Islands, now cultivated in most tropical countries.

5. **A. stipulacea** Klotz.

An erect, monoecious or dioecious shrub or small tree 2 to 6 m high, glabrous or nearly so. Leaves oblong-ovate to ovate-lanceolate, 10 to 20 cm long, 5 to 9 cm wide, shining, long-acuminate, base usually rounded, 3-nerved, margins crenulate. Spikes axillary, solitary, the staminate ones slender, greenish, dense, 2 to 2.5 mm in diameter, 10 to 20 cm long, the pistillate ones stouter, somewhat interrupted, the ovate bracts subtending the flowers greenish, toothed, 3 to 4 mm long; pistils purplish.

In thickets, San Pedro Macati, fl. Sept., and probably in other months; throughout the Philippines. Malaya to New Guinea and Samoa.

15. HEVEA Aublet

Trees with abundant milky sap and long-petioled, 3-foliolate leaves, the petioles glandular at the apex; leaflets entire, thin, penninerved. Flowers apetalous, monoecious, small, cymose, the cymes paniculate, the central flowers of each cyme usually female, the others male. Calyx 5-toothed or lobed. Male flowers: Stamens 5 to 10; filaments united; anthers 1- or 2-verticillate. Disk-glands 5, small, free or united. Female flowers with a 3-celled ovary; ovules 1 in each cell; stigma thick, sessile or nearly so. Seeds large, subglobose to oblong. (From the Carib name of some species.)

Species about 7, in the Amazon region, Guiana, etc., 1 now cultivated in many tropical countries.

* 1. H. BRASILIENSIS (HBK.) Muell.-Arg. Para Rubber Tree.

A nearly glabrous tree reaching a height of 20 m. Leaflets 10 to 20 cm long, elliptic, elliptic-lanceolate, or oblong-obovate, narrowed to the base, acuminate, about as long as the petioles. Panicles about one-half as long as the leaves, pyramidal. Flowers white-tomentose. Stamens 10, 2-seriate, the staminal-column long-produced above the anthers. Capsule large. Seeds oblong, spotted, 2.5 to 3 cm long.

Immature specimens cultivated in Singalon; of recent introduction in the Philippines.

16. **MALLOTUS** Loureiro

Shrubs or trees with opposite or alternate, entire, toothed, or lobed, 3- to 7-plinerved or penninerved leaves, sometimes peltate, often gland-dotted on the lower surface and with glandular areas near the base on the upper surface. Flowers small, apetalous, monoecious or dioecious, in simple or panicled spikes or racemes, the males clustered, the females solitary. Male flowers: Calyx globose or ovoid, valvately 3- to 5-cleft. Stamens 20 to many, on a central receptacle; filaments free; anthers small, 2-celled. Female flowers: Calyx spathe-like or valvately 3- to 6-lobed. Ovary 2- to 4-celled; styles various; ovules 1 in each cell. Capsule of two or three, 2-valved, smooth, tubercled, or spinous cocci. (Greek "woolly," from the soft pubescence of some species.)

Species about 80 in the tropics of the Old World, about 20 in the Philippines.

1. Capsules unarmed; leaves alternate.
  2. Leaves orbicular-ovate, angularly repand or toothed, the younger ones deeply 3- to 5-lobed; capsules brown-pubescent. 1. *M. moluccanus*
  2. Leaves oblong-ovate, entire or subentire; capsules covered with a red powder.......... 2. *M. philippensis*
1. Capsules pubescent and armed with scattered, short, spine-like processes; leaves opposite.......... 3. *M. papillaris*

1. M. moluccanus (L.) Muell.-Arg. Alim (Tag.).

A shrub or small tree 4 to 10 m high, more or less finely stellate-pubescent and furfuraceous. Leaves large, orbicular-ovate, 10 to 25 cm long, acuminate, base cordate, some often deeply 3- to 5-lobed, others coarsely angular-toothed or repand. Panicles in the upper axils, up to 20 cm long. Flowers greenish-yellow, the males fascicled along the branches of the inflorescence, the sepals reflexed at flowering time, elliptic-lanceolate, about 7 mm long. Capsule about 7 mm long and wide, smooth, stellate-pubescent at least when young, of 2 or 3 dehiscent cocci. (Fl. Filip. *pl. 218.*)

In thickets and waste places, occasionally also in gardens, fl. all the year; throughout the Philippines. Malaya.

2. M. philippensis (Lam.) Muell.-Arg. Banato (Tag.).

A tree 4 to 10 m high, the branchlets, young leaves, and inflorescence brown-pubescent. Leaves alternate, oblong-ovate, entire or sinuate-toothed, acuminate, 7 to 16 cm long, base rounded, 3-nerved, with 2 glands on the upper surface which is glabrous, the lower surface somewhat glaucous, puberulent, with numerous small, scattered, crimson glands. Inflorescence axillary. Male spikes solitary or fascicled, 5 to 8 cm long, densely many-flowered, the flowers about 3 mm in diameter, the anthers with crimson glands. Female racemes solitary, 3 to 7 cm long. Ovary and styles with crimson glands. Fruit subglobose, 6 to 8 mm in diameter, unarmed, densely covered a red or crimson powder.

In thickets San Juan del Monte, fl. March–April; widely distributed in the Philippines. India to southern China, through Malaya to Australia.

3. M. papillaris (Blanco) Merr.

An erect shrub 2 to 3 m high, all parts more or less densely and softly pubescent with short stellate hairs. Leaves opposite, orbicular-ovate to broadly ovate, 5 to 16 cm long, base broad, rounded or slightly cordate, 3-nerved, apex somewhat acuminate, margins entire or somewhat repand, the lower surface with numerous, small, pale-yellow, waxy glands. Male inflorescence axillary, racemose, solitary, 6 to 18 cm long, the flowers fascicled, ebracteolate, pale-yellow. Capsules depressed-globose, about 1.2 cm in diameter, densely pale-stellate-puberulent, and with scattered, soft, pubescent, spine-like processes or papillae which do not form a continuous covering. (Fl. Filip. *pl. 381, Adelia papillaris.*)

In dry thickets, Guadalupe and opposite San Pedro Macati. fl. May and probably in other months; of local occurrence in Luzon. Endemic.

17. MACARANGA Thouars

Trees or shrubs with ample, alternate, entire or lobed, often peltate leaves which are glandular beneath, 3- to 5-nerved from the base. Flowers apetalous, small, usually dioecious, in axillary racemes or in panicles, the males many, clustered, the females one or few to each bract; bracts often large, entire or toothed. Male flowers: Calyx globose, with 3 or 4 valvate sepals. Stamens usually many, central; anthers 3- or 4-celled. Female flowers: Calyx 2- to 4-lobed or toothed. Ovary 1- to 6-celled; styles entire; ovules 1 in each cell. Capsules of 1 to 5, 2-valved, naked or armed cocci, often waxy-glandular. (From the Madagascar name of one species.)

Species more than 100, in the tropics of the Old World, 10 or more in the Philippines.

Leaves less than 25 cm long; capsules waxy-glandular........ 1. *M. tanarius*
Leaves up to 1 m in length; capsules glabrous..................... 2. *M. grandifolia*

1. M. tanarius (L.) Muell.-Arg. Binonga (Tag.).

A small dioecious tree 4 to 8 m high, nearly glabrous or in the var. *tomentosa* Muell.-Arg. softly pubescent, the leaves peltate, ovate to oblong-ovate, 10 to 25 cm long, entire or denticulate, base rounded, apex slenderly acuminate. Male flowers peduncled, slender, branched, shorter than the leaves, the bracts ovate, toothed or pectinate, 5 to 10 mm long, the flowers small, fascicled in the axils of the bracts. Female flowers in usually simple panicled spikes or racemes. Capsules 10 to 12 mm in diameter, of 2 or 3 cocci, covered with pale waxy glands, and with soft, scattered, elongated, spine-like processes.

In thickets, Pasay, San Juan del Monte, etc., fl. Jan.–Apr.; common and widely distributed in the Philippines. Malay Peninsula and Archipelago.

2. M. grandifolia (Blanco) Merr. (*M. porteana* E. André). Bingabing (Tag.).

An erect, nearly glabrous or somewhat pubescent tree 5 to 10 m high with very large, peltate, orbicular-ovate to broadly-ovate, long-petioled leaves which are often reddish when young, 60 to 100 cm in diameter; stipules 6 to 10 cm long. Male flowers panicled, the bracts oblong to lanceolate, 3 to 5 cm long, the bracteoles entire, ovate to lanceolate, acuminate, 3 to 7 mm long, each subtending several small flowers. Capsules long-pedicelled, in dense globose masses, glabrous, 8 to 10 mm long, of 2 dehiscent, coriaceous cocci, each valve armed with 2 spine-like processes at the apex.

Occasionally cultivated, Singalon, fl. Feb., and probably in other months; widely distributed in Luzon. Endemic.

18. HOMONOIA Loureiro

Dioecious shrubs with alternate, narrow, entire leaves, glandular-lepidote beneath. Flowers small, in axillary, many-flowered spikes, apetalous. Male flowers: Calyx globose, splitting into 3 valvate segments. Stamens numerous, crowded, in globose heads of branched filaments and anthers. Rudimentary ovary none. Female flowers: Sepals 5 to 8, narrow, unequal, imbricate, deciduous. Ovary 3-celled; styles spreading. Fruit a small capsule of three 2-valved 1-seeded cocci. (Greek "harmony," reference to the more or less united stamens.)

Species 3 or 4, India and Malaya, 2 in the Philippines.

1. **H. riparia** Lour. Lumanaya (Tag.); Miagos (Vis.).

A shrub 1 to 3 m high. Leaves linear-lanceolate, acuminate, 12 to 20 cm long, green and shining on the upper surface, the lower surface pale and brown-lepidote. Spikes axillary, solitary, 5 to 12 cm long, pubescent. Capsules about 8 mm in diameter, pubescent. (Fl. Filip. *pl. 338.*)

In stream-bed San Juan River at San Francisco del Monte, fl. Mar.–Apr.; throughout the Philippines in similar habitats. India to Malaya.

19. RICINUS Linnaeus

A coarse, erect, branched annual herb, or shrubby and perennial. Leaves large, alternate, orbicular-ovate, peltate, palmately lobed. Flowers apetalous, monoecious, in axillary, subpaniculate racemes, the lower ones male, in scattered fascicles, the upper ones female, crowded. Male flowers: Calyx thin, splitting into 3 to 5 segments. Stamens very numerous, the filaments variously connate in branching clusters. Female flowers: Calyx spathe-like, caducous. Ovary 3-celled. Styles short or long, spreading, entire or 2-fid. Capsule of three 2-valved 1-seeded cocci. (The ancient Latin name.)

A monotypic genus.

1. **R. COMMUNIS** L. Tangan-tangan (Tag.); Castor Oil Plant.

Coarse, erect, branched, 1 to 4 high, glabrous, the younger parts glaucous, the vegetative parts and inflorescence green or purplish. Leaves thin, 20 to 60 cm in diameter, the lobes oblong, acuminate, serrate; petioles long, with a gland at the apex. Racemes stout, erect. Male flowers about 1 cm in diameter. Capsule ovoid, 1 to 1.5 cm long, green or purplish, covered with soft spine-like processes.

In open waste places, fl. all the year; common in and about towns throughout the Philippines, and of prehistoric introduction. Probably a native of Africa, now in all tropical and many temperate countries, wild or cultivated.

20. MANIHOT Adanson

Glabrous trees or shrubs, often somewhat glaucous, with milky sap, sometimes from fleshy roots. Leaves alternate, usually deeply 3- to 11-lobed. Flowers medium, apetalous, monoecious, in racemes, cymes, or panicles. Male flowers: Calyx usually colored, campanulate, 5-lobed, the lobes imbricate. Stamens 10, inserted in 2 rows between the lobes or glands of the disk; filaments free. Female flowers: Calyx as in the male. Disk lobed or entire. Ovary 3-celled, cells 1-ovuled. Capsule of three 2-valved cocci. (From the Brazilian name of some species.)

Species 128 in tropical America, mostly in Brazil, 2 introduced in the Philippines.

Shrubs from fleshy roots, the leaf-lobes 3 to 7, lanceolate to oblong-oblanceolate; fruit longitudinally 6 ridged.................................. 1. *M. utilissima*

Trees with 3- to 5-lobed leaves; the lobes obovate to elliptic; fruit not ridged.. 2. *M. glaziovii*

1. M. UTILISSIMA Pohl. Camoteng-cahoy (Tag.); Cassava, Manioc, Tapioca Plant.

An erect, glabrous suffrutescent or shruby plant 1.5 to 3 m high from stout fleshy roots. Leaves 10 to 20 cm long, pale beneath, palmately divided nearly to the base into 3 to 7, lanceolate to oblong-oblanceolate, entire, acuminate segments, some of the upper leaves often entire. Inflorescence axillary, lax, few-flowered. Flowers about 1 cm long. Capsules ovoid, about 1.5 cm long, longitudinally narrowly 6-winged.

Common in hedge-rows along streets, etc., rarely flowering in Manila; common and widely distributed in the Philippines in cultivation. A native of tropical America, now planted in all warm countries.

*2. M. GLAZIOVII Muell.-Arg. Ceara Rubber Tree.

A glabrous tree reaching a height of 12 m or more, with thin, somewhat papery bark. Leaves long-petioled, 8 to 20 cm long, somewhat peltate at the cordate base, glaucous beneath, palmately. 3- to 5-lobed, the lobes obovate to broadly elliptic, acute or shortly acuminate, entire. Panicles in the uppermost axils, shorter than the leaves. Flowers about 1 cm long. Capsule ellipsoid, 2 to 2.3 cm long, not longitudinally ridged.

Singalon, cultivated, fl. Sept.; of recent introduction here. One of the commercial rubber trees, a native of Brazil.

21. ALCHORNEA Swartz

Trees or shrubs, dioecious or monoecious, with simple, entire or toothed leaves, usually glandular at the base and often 3- or 5-nerved. Male flowers small, clustered on axillary or terminal, solitary or panicled spikes, the bracts small. Calyx small, globose, 2- to 4-valved. Petals none. Stamens 6 to 8 or more, the filaments free or connate below. Rudimentary ovary none. Female flowers in axillary or terminal spikes. Sepals 3 to 6, imbricate. Petals none. Ovary 2- to 4-celled; styles distinct, often long; ovules 1 in each cell. Capsule of two or three, 2-valved, crustaceous cocci.

Species about 30 of wide tropical distribution, 2 in the Philippines.

1. **A. sicca** (Blanco) Merr. Balanti (Tag.).[1]

An erect dioecious shrub usually 1 to 2 m high, glabrous or nearly so. Leaves ovate, 3 to 12 cm long, crenulate, acuminate, base glandular, rounded, 3-nerved. Male spikes axillary, catkin-like, green and purplish, 1 to 5 cm long, about 3 mm thick, flowers numerous, densely arranged. Stamens 8. Female flowers small, scattered in slender, erect, few-flowered, 2 to 10 cm long spikes, each flower with 3 acuminate bracts longer than the calyx, the styles simple, purple. Capsules ovoid, rugose, about 8 mm in diameter. (Fl. Filip. *pl. 307, Excoecaria sicca.*)

In thickets Pasay to San Felipe Neri, Pasig, etc., fl. Mar.–June; of local occurrence in the Philippines. Endemic.

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[1] This name is usually applied to species of *Homalanthus* that do not occur in our area.

22. EXCOECARIA Linnaeus

Glabrous shrubs or trees with abundant, acrid, milky juice, and alternate or opposite, entire or nearly entire leaves. Flowers apetalous, small, in dense, axillary spikes or racemes, dioecious or monoecious, the rachis glandular beneath or at the sides of the bracts. Male flowers 1 to 3 in each bract, 2-bracteolate. Sepals 3, small. Stamens 3; filaments free. Rudimentary ovary none. Female flowers at the base of the male spikes or racemes, or on separate ones. Calyx 3-fid. Ovary 3-celled; cells 1-ovuled; styles spreading or recurved. Capsules of 3 cocci, the valves elastically twisting and separating from the columella. (Greek "blindness," from reputed blinding effect of the milky juice.)

Species 30 or more in tropical Asia, Africa, and Australia, 2 or 3 in the Philippines.

1. **E. agallocha** L. Buta, Buta-buta (Tag.); Alipata, Lipata (Vis.).

A glabrous shrub or small tree 1 to 8 m high. Leaves alternate, elliptic-ovate, oblong-ovate, or ovate, shining, base rounded or acute, apex acuminate, 6 to 12 cm long, entire or nearly so. Male spikes axillary, solitary, 5 to 10 cm long, many-flowered. Female flowers in 2 to 3 cm long racemes, the sepals with a basal gland within. Capsules usually about 5 mm in diameter, subglobose, smooth.

Along tidal estuaries, fl. May–July, and probably in other months; throughout the Philippines along the seashore. India to southern China southward to Australia and Polynesia.

76. ANACARDIACEAE (CASHEW OR MANGO FAMILY)

Trees or shrubs, often with acrid and sometimes milky juice. Leaves alternate, exstipulate, simple or pinnate. Inflorescence mostly paniculate. Flowers small, regular, unisexual, polygamous, or perfect. Calyx 3- to 6-partite. Petals 3 to 6, alternate with the sepals, free, imbricate or valvate in bud. Disk flat, cup-shaped or annular, entire or lobed. Stamens as many as or twice as many as the petals, rarely fewer or only one, inserted under, rarely on the disk; filaments usually subulate; anthers 2-celled, basi- or dorsifixed. Ovary superior, 1- to 5-celled, or in *Buchanania* of 5 or 6 free carpels, often rudimentary in the staminate flowers; style 1 to 6, or stigmas subsessile; ovules solitary in the cells. Fruit a 1- to 5-celled, 1- to 5-seeded drupe.

Genera about 60, species about 500, chiefly tropical, 11 genera and 35 species known from the Philippines.

1. Leaves simple; ovary 1-celled, or of several 1-celled carpels.
  2. Fruits seated on a much enlarged fleshy peduncle.
    3. Stamens twice as many as the petals, some of them imperfect; fleshy peduncle large, 5 to 7 cm long........................ 1. *Anacardium*
    3. Stamens as many as the petals; fleshy peduncle small, 1 to 1.5 cm long........................ 2. *Semecarpus*
  2. Peduncles not at all enlarged.
    3. Stamens 1 to 5; carpels 1; fruit a large fleshy edible drupe. 3. *Mangifera*
    3. Stamens 8 or 10; carpels 5; fruit a small drupe 1 cm long or less, the flesh scanty........................ 4. *Buchanania*
1. Leaves pinnate; ovary several-celled; fruit ovoid, the stone several-celled........................ 5. *Spondias*

1. ANACARDIUM Linnaeus

Small trees with alternate, petioled, simple, entire leaves. Panicles terminal. Flowers small, polygamous. Calyx 5-partite, segments erect, imbricate. Petals 5, linear-lanceolate, recurved. Disk filling the base of the calyx. Stamens usually 9, all fertile, one larger than the rest, filaments connate and adnate to the disk. Ovary obovoid; style filiform, excentric; stigma minute; ovule 1, ascending. Fruit kidney-shaped, seated on a large, fleshy, pyriform body formed of the enlarged disk and top of the peduncle; pericarp cellular and full of oil. Seed kidney-shaped. (Greek "resembling" and "heart," from the shape of the fruit.)

A genus of about 8 species, of tropical America, one now cultivated, and often naturalized, in many other tropical countries.

*1. **A. OCCIDENTALE** L. Casoy (Sp.-Fil.); Cashew.

A small tree, the trunk usually small, crooked. Leaves obovate, rounded or retuse at the apex, 10 to 20 cm long. Panicles as long as or exceeding the leaves, pubescent. Flowers small, crowded at the tips of the branches, yellow to yellowish-white, the petals usually with pink stripes. Fruit about 2 cm long, kidney-shaped, the pyriform, fleshy, edible receptacle yellowish, 5 to 7 cm long. (Fl. Filip. *pl. 116.*)

Cultivated for its edible fruit, fl. Dec.–Feb.; common throughout the Philippines, introduced from tropical America at an early date. Cultivated in all tropical countries.

2. SEMECARPUS Linnaeus filius

Shrubs or trees with simple, entire, coriaceous leaves, usually pale beneath. Flowers small, polygamous or dioecious, in terminal panicles. Calyx 5- or 6-parted. Petals 5 or 6, imbricate. Disk broad, annular. Stamens 5 or 6, inserted at the base of the disk, imperfect in the pistillate flowers. Ovary 1-celled; styles 3; ovules pendulous from a basal funicle. Drupe fleshy, oblong or subglobose, oblique, seated on a fleshy receptacle formed of the thickened disk and calyx-base; pericarp with an acrid resin. (Greek "mark" and "fruit," the juice of some species used to mark clothes.)

Species about 40, tropical Asia, Malaya, and Australia, about 10 known from the Philippines, one in our area.

1. **S. cuneiformis** Blanco (*S. perrottetii* March.). Ligas (Tag.).

A shrub or small tree 3 to 8 m high. Leaves somewhat crowded at the apices of the branches, lanceolate-obovate to oblong-obovate, subcoriaceous, pubescent and whitish beneath, 10 to 25 cm long, the apex rounded, acute, or slightly acuminate. Panicles usually longer than the leaves, diffuse. Flowers whitish, glomerate, 2 to 2.5 mm long. Drupe small, ovoid, somewhat oblique, about 1 cm long, the fleshy receptacle pyriform, purplish, about as long as the drupe, edible. (Fl. Filip. *pl. 75.*)

In thickets, not uncommon, fl. Jan.–March; widely distributed in the Philippines at low altitudes, and also reported from Celebes.

This species, like the poison-oak (*Rhus*) of the United States is a violent contact-poison to many persons, while others are immune. The rash caused by it is very irritating, is similar to that produced by poison-oak, and is probably caused by similar agencies.

3. MANGIFERA Linnaeus

Large trees with entire, coriaceous leaves. Flowers small, polygamous, in terminal panicles, the pedicels articulate, the bracts small, deciduous. Calyx 4- or 5-partite. Petals 4 or 5, free from the disk. Stamens 5, one perfect and larger than the others, the other 4 smaller, imperfect. Ovary sessile, 1-celled, oblique; style lateral; ovule pendulous. Fruit a large fleshy drupe; seed large, compressed, fibrous or smooth. (Malay name of the fruit and the Latin "to bear.")

A tropical Asiatic, chiefly Malayan genus, of about 30 species, 4 or 5 known from the Philippines, a single cultivated one in our area.

*1. M. INDICA L. Manga (Sp.-Fil.); Mango.

A large tree, the crown dense, spreading. Leaves oblong to oblong-lanceolate, acuminate, 10 to 30 cm long. Panicles often as long as or exceeding the leaves, pubescent. Flowers yellow, small, 3 to 4 mm long. Disk 5-lobed. Perfect stamen 1, the other 4 much reduced. Ovary glabrous. Drupe yellow, fleshy, 10 to 15 cm long, oblong-ovoid, somewhat compressed. Seed large, flattened, fibrous. (Fl. Filip. *pl. 62*, *M. rostrata.*)

The well known mango, fl. Nov.–May, common in Manila and throughout the Philippines, introduced. A native of India or Malaya, now cultivated throughout the tropics.

4. BUCHANANIA Roxburgh

Trees with alternate, simple, entire leaves, the panicles terminal and axillary. Flowers small, perfect. Calyx short, persistent, 3- to 5-lobed. Petals as many as the calyx-lobes, recurved. Stamens 8 or 10, free. Carpels 5 or 6, free, one fertile, the others imperfect; style short; ovule solitary. Drupe small, compressed, with scanty flesh, the stone bony. (In honor of Dr. F. Buchanan-Hamilton, a Scotch physician and naturalist.)

Species about 20, tropical Asia to Australia and Polynesia, 4 or 5 in the Philippines, one in our area.

1. **B. arborescens** Blume (*B. florida* Schauer). Balinhasay (Tag.).

A tree 5 to 10 m high, glabrous or nearly so. Leaves oblong-obovate, acute or rounded, base narrowed, 8 to 25 cm long, somewhat crowded toward the ends of the branches. Panicles in the uppermost axils, many on each branch, 6 to 20 cm long, rather narrow. Flowers very numerous, white, 3 to 4 mm long, the petals reflexed. Fruit red, compressed, suborbicular to ovoid, 7 to 10 mm long, the pulp very thin and scanty. (Fl. Filip. *pl. 63*, *Fagara decandra.*)

In thickets, Masambong, San Pedro Macati, etc., fl. Feb.–June; very common and widely distributed in the Philippines. India to Malaya.

5. SPONDIAS Linnaeus

Deciduous glabrous trees. Leaves pinnate, alternate, more or less crowded at the tips of the branchlets. Leaflets subopposite. Panicles terminal, spreading. Flowers small, polygamous. Calyx small, 4- or 5-fid. Petals 4 or 5. Disk cupular, broad, crenate. Stamens 8 or 10 inserted beneath the disk. Ovary sessile, free, 4- or 5-celled; styles 4 or 5, conniving; ovules solitary, pendulous. Drupe fleshy; stone hard, thick, 1- to 5-celled, the cells opening by canals through the top of the stone. (Greek name of a tree.)

Species about 5, all tropical, 2 in the Philippines of which the following is introduced.

*1. S. PURPUREA L. Sirihuelas (Tag.). (Corruption of Sp. *Ciruela*= "Plum.")

A deciduous tree usually about 8 m high with stout trunks and stout spreading branches. Leaves pinnate, 15 to 25 cm long. Leaflets 5 to 9 pairs, oblong-ovate, inequilateral, acuminate, thin, 5 to 7 cm long, entire or slightly crenate. Flowers solitary or fascicled in the axils of fallen leaves, reddish, 3 to 3.5 mm long, pedicels jointed. Stamens 10, 5 alternating ones longer than the others. Fruit subglobose, about 2.5 cm long, the pericarp fleshy, purplish outside, the stone large, very hard. (Fl. Filip. *pl. 182.*)

Common along the Parañaque road, and occasional in other places, deciduous and fl. Feb.–Apr.; widely distributed in the Philippines. A native of tropical America, introduced into the Philippines at an early date.

77. CELASTRACEAE (CELASTRUS FAMILY)

Trees or shrubs, often climbing. Leaves opposite or alternate, simple, petioled. Flowers perfect or polygamous, small, cymose or panicled. Calyx small, 4- or 5-lobed, imbricate, persistent. Petals 4 or 5, free, imbricate. Stamens usually the same number as the petals. Disk prominent, lobed or entire. Ovary sessile, free or confluent with the disk, 3- to 5-celled, cells 2-ovuled; style short or none. Fruit a dehiscent capsule with arillate seeds, or hard and indehiscent with many scattered seeds.

Genera about 38, species 450 or more, in most temperate and tropical regions, 3 genera and about 12 species in the Philippines.

1. Inflorescence of terminal and axillary panicles........................ 1. *Celastrus*
1. Inflorescence of short, dichotomous, axillary cymes.
  2. Fruit a dehiscent, few-seeded capsule........................... 2. *Gymnosporia*
  2. Fruit many-seeded, indehiscent.. 3. *Siphonodon*

1. CELASTRUS Linnaeus

Scandent shrubs with alternate, petioled leaves and terminal and axillary panicles. Flowers small. Calyx 5-cleft. Petals 5, spreading. Stamens 5, on the margin of the broad disk. Ovary 2- to 4-celled, cells 2-ovuled, not immersed in the disk; style short, the stigma 3-lobed. Fruit a globose or obovoid, 1- to 3-celled, 1- to 6-seeded, dehiscent capsule, the seeds enveloped in a fleshy aril. (An ancient Greek name.)

Species about 15, tropical Asia to Japan, Malaya and Australia, and in North America, 1 in the Philippines.

1. **C. paniculata** Willd.

A scandent shrub reaching a length of from 4 to 10 m, glabrous, the branches lenticellate, pendulous. Leaves ovate to elliptic-ovate, 5 to 12 cm long, shortly and abruptly acuminate, crenate, thin. Panicles 7 to 18 cm long, rather narrow, lax, pendulous. Flowers numerous, greenish or greenish-white, about 5 mm in diameter. Capsules ovoid or subglobose, 7 to 9 mm long, yellow, 3-celled, usually 3-seeded, the fleshy aril surrounding the seeds red.

In thickets near Pasig, fl. Apr.–March; widely distributed in the Philippines. India to Malaya.

2. GYMNOSPORIA Wight & Arnott

Shrubs or small trees, often subscandent, branches usually spiny. Leaves alternate. Flowers in axillary cymes. Calyx 4- or 5-cleft. Petals 4 or 5, spreading. Stamens 4 or 5, inserted underneath the disk. Ovary immersed in the disk, usually 3-celled, cells 2-ovuled. Capsules dehiscent, seeds 1 or 2 in each cell, arillate. (Greek "naked" and "seed.")

Species 60 or more, widely distributed in warm countries, a single variable one in the Philippines.

1. **G. spinosa** (Blanco) Merr. & Rolfe.

A somewhat scandent, glabrous shrub 1 to 4 m high, the axils usually with very small, short spines. Leaves obovate to oblong-obovate, apex rounded, base wedge-shaped, margins finely toothed, 5 to 10 cm long. Cymes small, axillary, rather few-flowered, slender, subumbellate, 1 to 2 cm long. Flowers small, greenish-white, 5-merous, the calyx-teeth small. Petals oblong, obtuse, 3 mm long. Capsules red, subglobose, 5 to 8 mm long, somewhat 3-angled.

In thickets, Masambong to Pasay, fl. Oct.–Dec.; widely distributed in the Philippines. Endemic.

3. SIPHONODON Griffith

Small glabrous trees with alernate, shortly petioled, slightly crenate leaves. Inflorescence axillary, subcymose, few-flowered. Flowers small, 5-merous, Calyx 5-cleft. Petals 5, spreading. Disk not distinct. Stamens 5, connivent around the pistil, the filaments flattened. Ovary half-immersed, conical, the summit hollowed out, stigmatose in the cavity; cells numerous in 2 to 4 series, each 1-ovuled. Fruit ovoid or globose, hard, of uniform texture throughout, the pulp brittle when dry, the numerous seeds scattered irregularly through the dry pulp.

Species 3, India to Australia, 2 in the Philippines.

1. **S. celastrineus** Griff. Matang-olang (Tag.).

A small tree 5 to 8 m high. Leaves pale when dry, oblong, shining, coriaceous, 12 to 22 cm long, acuminate, base acute, the petiole less than 1 cm long. Flowers small, greenish, the petals about 1.5 mm long. Fruit globose or ovoid, pale when dry, glabrous, 1.5 to 2.5 cm in diameter.

In dry thickets Masambong, San Francisco del Monte, etc., fl. May; of wide distribution in the Philippines at low altitudes, India to Malaya.

76. HIPPOCRATEACEAE (HIPPOCRATEA FAMILY)

Scandent, unarmed, usually glabrous shrubs with opposite, rarely alternate, simple, entire or slightly toothed leaves. Flowers small, regular, perfect, in axillary or terminal fascicles or cymes. Calyx-tube short, the lobes 5, imbricate. Petals 5, free, inserted under the disk, imbricate, rarely valvate. Disk strongly developed, usually thick and fleshy, lobed or entire. Stamens 3, rarely 2, 4, or 5, inserted on the disk; filaments short, flattened, free, or somewhat adnate to the ovary, recurved. Ovary surrounded by the disk, 3-celled; ovules 2 to 10 in each cell. Fruit subglobose, baccate or drupaceous, 1- to 3-celled, fleshy, indehiscent, or of 3 elongated flattened carpels which are connate below, and usually dehiscent. Seeds winged or not.

Genera 2, species about 150 in the tropics of both hemispheres, 2 genera and 5 or 6 species in the Philippines.

1. SALACIA Linnaeus

Climbing shrubs. Leaves opposite, exstipulate, entire or somewhat toothed. Flowers few to many, usually in axillary, clusters, more rarely cymose. Calyx small, 5-lobed. Petals 5, imbricate. Stamens usually 3, sometimes 2 or 4, inserted on the disk. Ovary conical, immersed in the disk, 3-celled; style very short; stigma simple or 3-lobed; ovules 2 to 8 in each cell, in 1 or 2 series, inserted in the inner angle. Fruit fleshy, drupaceous, indehiscent. (A name of Greek mythology, the wife of Neptune.)

Species about 85, in all tropical countries, 3 or 4 in the Philippines.

1. S. prinoides (Willd.) DC.

A climbing shrub reaching a height of 4 m or more, quite glabrous. Leaves oblong, shining, 8 to 16 cm long, entire or faintly and distantly toothed, acute or slightly acuminate, base usually acute. Cymes axillary, solitary, peduncled, dichotomous, few-flowered, 2.5 to 3 cm long. Sepals very small. Petals 5, oblong, obtuse, yellow, about 3.5 mm long, spreading or reflexed. Stamens 3, rarely 4. Fruit ovoid or globose, red, about 1 cm in diameter, 1-seeded. (Fl. Filip. *pl. 86.*)

In dry thickets opposite Fort McKinley, fl. Jan.–Apr.; widely distributed in the Philippines. India and Ceylon to Malaya.

79. SAPINDACEAE (SOAPBERRY OR ALUPAG FAMILY)

Shrubs or trees, or in *Cardiospermum* wiry, herbaceous, tendril-bearing vines. Leaves alternate, rarely opposite, simple, pinnate, 3-foliolate, or palmately compound, the leaflets entire or toothed, in the pinnate leaves alternate or opposite. Inflorescence terminal or axillary, racemose or panicled. Flowers small, regular, irregular, or unsymmetrical, sometimes polygamo-dioecious. Calyx 4- or 5-lobed, often unequal, the lobes or sepals imbricate or valvate. Petals free, equal or unequal, 4 or 5, rarely none, often bearded or with a scale at the base within. Disk annular or unilateral. Stamens 5 to 10, inserted inside or outside of the disk; filaments often pubescent, free. Ovary frequently excentric, entire or lobed, 1- to 4-celled, cells 1- or 2-ovuled. Fruit capsular, dehiscent or indehiscent, or sometimes berry-like, entire or lobed. Seeds arillate or naked.

Genera about 130, species more than 1,000, in all parts of the world, chiefly tropical, 25 genera and about 70 species in the Philippines.

1. Tendril bearing herbaceous vines with biternate leaves, the capsules inflated.......... 1. *Cardiospermum*
1. Erect shrubs or trees.
    2. Fruit indehiscent.
        3. Shrubs with palmately 3- to 5-foliolate leaves.......... 2. *Allophylus*
        3. Leaves pinnate.
            4. Basal leaflets large and stipule-like; shrubs with smooth, fleshy fruits.......... 3. *Otophora*
            4. Basal leaflets not enlarged; trees with roughened or tubercled fruits.......... 3. *Euphoria*
    2. Fruit dehiscent.
        3. Capsules obovoid, 3-winged, 3-celled; leaves not glandular beneath. 5. *Guioa*
        3. Capsules of one or two, ellipsoid, terete lobes; leaves with prominent glands in the axils of the nerves on the lower surface.... 6. *Arytera*

1. CARDIOSPERMUM Linnaeus

Climbing, tendril-bearing, slender, herbaceous vines. Leaves alternate, exstipulate, biternate, the leaflets very coarsely toothed or lobed. Inflorescence of axillary, solitary, few-flowered, long-peduncled cymes or racemes, the lowest pair of pedicels developed into spiral tendrils. Flowers small, irregular, polygamo-dioecious. Sepals 4, concave, the two outer ones small. Petals 4, the two larger ones usually adhering to the sepals, and with an emarginate scale above the base, the two smaller ones distant from the stamens. Stamens 8, excentric; filaments free or connate at the base. Ovary 3-celled; style trifid; ovules solitary. Capsule inflated, loculicidal, 3-celled, 3-valved, the valves thin, veiny. Seeds globose, arillate at the base. (Greek "heart" and "seed.")

Species 11, mostly in tropical America and Africa, 1 in the Philippines.

1. C. HALICACABUM L. Balloon Vine.

A slender herbaceous vine 1 to 3 m in length, more or less pubescent, the stems prominently furrowed. Leaves 5 to 9 cm long, deltoid in outline, the leaflets ovate to lanceolate, acuminate, coarsely dentate or lobed, 1 to 5 cm long, membranaceous. Flowers small, white, about 2.5 mm long. Fruit obovoid, 1.5 to 2.5 cm long, somewhat triangular and 3-keeled, apex subtruncate. Seeds globose, black, with a prominent, white, heart-shaped aril at the base.

Occasionally cultivated, also sometimes found in thickets, fl. Aug.–Jan.; widely distributed in the Philippines, certainly introduced. Most tropical countries, probably a native of India.

2. ALLOPHYLUS Linnaeus

Shrubs or small trees with 1- to 5-foliolate, exstipulate leaves, the leaflets entire or toothed. Inflorescence axillary, of simple or branched racemes. Flowers small, 4-merous, polygamo-dioecious, globose, greenish or yellowish-white, their pedicels short. Sepals 4, in opposite pairs, hooded, thin, imbricate, the two outer ones smaller than the inner pair. Petals 5, the place of the fifth vacant, small, sometimes declinate, rarely obsolete, naked or supplied with a shaggy scale above the claw. Disk one-sided, usually with four glands opposite the petals. Stamens 8, on the receptacle inside the disk. Ovary usually 2-lobed, 2-celled; ovules solitary. Fruit indehiscent, usually fleshy, of 2 or 3 globose or obovoid, indehiscent, cocci, the cocci drupe-like, seeds with a short thin or fleshy aril (Greek "another" and "tribe.")

Species 156, in all tropical countries, about 17 in the Philippines.

1. A. dimorphus Radlk.

An erect shrub 2 to 5 m high the younger parts and leaves softly pubescent. Leaves 3- and 5-foliolate on the same plants, elliptic or oblong-lanceolate to ovate-lanceolate or lanceolate, acuminate, base narrowed, margins coarsely and irregularly serrate, the larger ones up to 12 cm in length, stalked, the lower two, when present, sessile or subsessile, very much smaller than the other three. Racemes slender, axillary, solitary, peduncled, 5 to 18 cm long, many-flowered, pubescent. Flowers about 3 mm in diameter, greenish-white. Fruit a single, obovoid to subglobose indehiscent coccus about 5 mm long, red, with scanty pulp. (Fl. Filip. *pl. 260, A. blancoi.*)

In dry thickets La Loma to Fort McKinley, fl. June–July; widely distributed in Luzon and Mindoro. Endemic.

3. OTOPHORA Blume

Erect shrubs or trees with alternate pinnate leaves, the basal leaflets stipule-like. Inflorescence axillary and terminal, paniculate, the flowers regular, polygamous, the sepals 4 or 5, concave, imbricate. Petals 5 or 4, smaller than the sepals, subauriculate at the base. Disk complete, annulate, crenate or entire. Stamens usually 8, sometimes fewer, inserted within the disk. Ovary 2- to 4-celled; ovules 1 in each cell; stigma sessile. Fruit fleshy, 1- to 4-celled, indehiscent, the seeds arillate. (Greek "ear" and "to bear," allusion to the two lower stipule-like leaflets.)

Species about 15, Malay Peninsula and Archipelago, 2 in the Philippines.

1. **O. fruticosa** Blume. Balinaunau (Tag.).

An erect glabrous shrub 2 to 4 m high. Leaves 20 to 50 cm long, the leaflets oblong to oblong-lanceolate, acute or acuminate, entire, 8 to 25 cm long, the basal 2 ovate to orbicular, stipule-like, 1 to 4 cm in diameter. Panicles purple, lax, 15 to 40 cm long, the flowers racemosely arranged, male and perfect flowers in the same panicle. Flowers dark-purple, about 7 mm in diameter, the anthers yellow. Fruit red, subglobose to ellipsoid or obovoid, 8 to 13 mm long. (Fl. Filip. *pl. 110, Otolepis nigrescens.*)

In thickets, Singalon, Pasay, etc., occasional, fl. Dec.–Feb.; widely distributed in the Philippines. Malaya.

4. EUPHORIA Commerson

Trees with alternate, exstipulate, simply pinnate leaves, the leaflets entire, usually glaucous beneath. Inflorescence terminal and axillary, paniculate. Flowers regular, polygamous. Calyx deeply 5-cleft, pubescent, lobes imbricate. Petals 5, spatulate to lanceolate, hairy within. Disk pubescent. Stamens usually 8, about as long as the petals, inserted within the disk. Ovary 2-, rarely 3-lobed, 2- or 3-celled, verrucose; ovules solitary; style 2- or 3-lobed, erect. Fruit ellipsoid to globose, of a single indehiscent coccus, verrucose or echinate, the pericarp crustaceous. Seed surrounded by a fleshy, usually edible aril. (Greek "well" and "to bear.")

Species about 6, tropical Asia to Malaya, 3 in the Philippines.

* 1. E. LONGANA Lam. (*Nephelium longana* Camb.). Guin-guin (Tag.).

A tree 8 to 12 m high, the young branchlets rusty-pubescent. Leaves 17 to 25 cm long; leaflets subopposite, or alternate, 6 to 10, oblong to lanceolate, coriaceous, glabrous or nearly so, usually obtuse, base somewhat inequilateral, acute or obtuse, 6 to 15 cm long. Panicles terminal and axillary, rusty pubescent, many-flowered, up to 15 cm long. Flowers yellowish-white, 4 to 5 mm in diameter. Fruit reddish or purple when mature, globose, 1 to 2 cm in diameter, the tubercles rugose or smooth. Aril pulpy, edible.

Rarely cultivated, Malate, opposite San Pedro Macati etc., said to flower very rarely, Feb.–Apr. Extensively cultivated, India to southern China.

The very common, endemic, *Euphoria cinerea* (Turcz.) Radlk., widely known as *alupag*, is found throughout the Philippines, but does not occur in our area.

5. GUIOA Cavanilles

Shrubs or trees with alternate pinnate leaves; leaflets not exceeding 10, entire, mostly abruptly pinnate, opposite, subopposite, or alternate. Panicles axillary and subterminal, ample, many-flowered. Flowers nearly regular, polygamo-dioecious. Sepals 4 or 5, free or somewhat united at the base, rounded, concave, imbricate, in two rows. Petals as many as the sepals, with 2 scales at the base inside. Disk annular, entire or interrupted. Stamens 8, inserted within the disk. Ovary 3-angled, 3-celled, obovoid to obcordate; ovules solitary. Fruit capsular, obovoid, 3-celled, 3-winged, loculicidally 3-valved. Seeds more or less compressed, arillate. (In honor of J. Guio y Sanchez, an artist on the Malaspina Expedition.)

Species about 35, India to southern China, southward to Australia and Polynesia, 10 in the Philippines.

1. **G. perrottetii** (Blume) Radlk. Salab (Tag.).

A small tree 5 to 10 m high, glabrous or nearly so. Leaves 14 to 25 cm long, alternate. Leaflets 4 to 8, subalternate, lanceolate, to oblong-lanceolate, straight or somewhat falcate, 6 to 12 cm long, apex somewhat acuminate. Inflorescence axillary, paniculate, 7 to 12 cm long, the flowers numerous, subracemosely disposed on the elongated branches. Flowers white, about 5 mm in diameter, sepals and petals ciliate on the margins. Capsules red, stipitate, broadly obovate, apex retuse, about 1.5 cm wide, consisting of three spreading, rounded lobes.

In thickets Masambong, fl. Dec.–Jan.; widely distributed in the Philippines. Endemic.

6. ARYTERA Blume

Shrubs or trees with alternate pinnate leaves, the leaflets few, entire, the axils of the nerves beneath usually glandular. Panicles axillary and terminal, many-flowered. Flowers small. Petals 5, usually with two scales at the base inside. Disk annular. Stamens 8, exserted. Ovary 2- or 3-celled, usually lobed. Capsules dehiscent, of 1 to 3 ellipsoid lobes, or angled. Seeds entirely or nearly sorrounded by the aril. (Greek "a small bowl.")

Species about 20, India to China, southward to Australia and Polynesia, 2 or 3 in the Philippines.

1. **A. litoralis** Blume. Alasan (Tag.).

A shrub or tree, 4 to 10 m high, glabrous except the younger parts and inflorescence. Leaves 20 to 30 cm long; leaflets 3 to 6, subopposite or alternate; oblong-ovate to broadly lanceolate, entire, acuminate, base acute, 8 to 18 cm long, with prominent glands in the axils on the lower surface. Panicles axillary and terminal, rusty-pubescent, 10 to 14 cm long, many-flowered. Flowers yellowish-white, somewhat fragrant, 2 to 3 mm in diameter. Capsule usually of 2, sometimes only 1, orange-yellow, ellipsoid to oblong lobes about 1.5 cm long, ultimately splitting down one side; seed nearly covered by the aril.

In dry thickets opposite Guadalupe, fl. Apr.; widely distributed in the Philippines. India to China, southward to Malaya.

80. BALSAMINACEAE (BALSAM OR CAMANTIGUI FAMILY)

Erect, succulent, more or less branched herbs. Leaves opposite, alternate, or somewhat whorled, simple, exstipulate. Flowers irregular, perfect, rather large and showy, on axillary or terminal, 1- to several-flowered peduncles. Sepals 3, imbricate, the posterior one large, petaloid, produced into a hollow sack or spur, the 2 anterior ones small, green. Petals 3 or 5, the lateral ones 2-lobed. Stamens 5; filaments short, broad; anthers cohering. Disk none. Ovary oblong, 5-celled; stigma sessile, 5-toothed; ovules many. Fruit a loculicidal capsule, valves springing elastically away from the axis. Seeds smooth or tubercled, small.

A single genus of over 350 species, very numerous in the mountains of tropical Asia and Africa, few in temperate Europe, North America, etc., about 25 species known from the Philippines, a single introduced one in our area.

1. IMPATIENS Linnaeus

Characters of the Family. (Latin "impatient" because of the elastically dehiscent capsules.)

1. I. **BALSAMINA** L. Camantigui (Tag.); Balsamina (Sp.); Balsam.

An erect, succulent, branched herb 1 m high or less. Leaves glabrous or somewhat pubescent, 3 to 5 cm long, narrowly lanceolate, or oblanceolate, acuminate, deeply serrate, alternate; petioles glandular. Flowers axillary, showy, 2 to 3 cm long, usually pink, but forms with white, red, purple, and variegated petals found in cultivation, the spur long, slender. Fruit pubescent. (Fl. Filip. *pl. 424.*)

A common and variable garden plant, cultivated for ornamental purposes, fl. more or less all the year, extensively cultivated in the Philippines, occasionally subspontaneous. A native of British India, now found in cultivation in most warm and tropical countries.

81. RHAMNACEAE (BUCKTHORN OR LIGAA FAMILY)

Erect trees or shrubs or scandent shrubs (in *Gouania* tendril-bearing), often spiny. Leaves simple, alternate, mostly 3- to 5-nerved, the stipules small, often transformed into prickles. Flowers perfect or polygamous, small, in axillary or terminal cymes, fascicles, racemes, or panicles. Calyx 4- or 5-fid, the lobes triangular, erect or recurved, usually keeled on the inside. Petals 4 or 5, rarely none, hooded or involute, usually shorter than the calyx-lobes, inserted on the throat of the calyx. Stamens 4 or 5, inserted with the petals and opposite them. Disk fleshy, filling the calyx-tube or thin and lining it, entire or lobed. Ovary sessile, free or immersed in the disk, 2- to 4-celled. Fruit a capsule or a dry or fleshy drupe, 1- to 4-celled, free or surrounded at the base by the calyx-tube.

Genera 51, species nearly 500, of wide temperate and tropical distribution, 8 genera and 20 species in the Philippines.

1. Trees or shrubs; fruit an indehiscent dry or fleshy drupe, the stone 1- to 4-celled.. 1. *Zizyphus*
1. Scandent shrubs; fruit a dehiscent, 3-celled, 3-seeded capsule.
    2. Fruit inferior, crowned by the calyx, 3-angled or 3-winged; flowers fascicled, on elongated simple or paniculate spikes or racemes. 2. *Gouania*
    2. Fruit superior, globose; flowers in short axillary cymes.... 3. *Colubrina*

1. ZIZYPHUS Adanson

Trees or shrubs, sometimes with pendulous branches, or scandent, frequently armed with stout, large or small spines. Leaves somewhat 2-

ranked, alternate, prominently 3-nerved, nerves sometimes more numerous, entire or toothed. Cymes axillary, peduncled. Flowers small, perfect. Calyx 5-fid, the lobes spreading or reflexed. Disk lobed, flat, or pitted, the margin free. Stamens 5. Ovary 2- or 4-celled, sunk in the disk and confluent with it at the base. Styles 2 or 4, free or more or less united. Fruit drupe-like, pulp fleshy or dry, the stone 1 to 4-celled, 1- to 4-seeded. (From Sisyphus, a fabulous king of Corinth.)

Species about 45 in temperate and tropical regions of both hemispheres, about 8 in the Philippines.

1. Cymes sessile or subsessile, leaves pale beneath; fruit fleshy, edible. 1. *Z. jujuba*
1. Cymes peduncled.
  2. Leaves very strongly inequilateral at the base; drupe glabrous, the stone 4-celled.............................. 2. *Z. trinervia*
  2. Leaves equilateral or slightly inequilateral at the base; drupe rusty-pubescent, the stone 2-celled.............................. 3. *Z. zonulata*

1. **Z. JUJUBA** Mill. Manzanas, Manzanitas (Sp.-Fil.).

A small tree 5 to 19 m high, the branches armed with short sharp spines. Leaves elliptic-ovate, rounded, green and glabrous on the upper surface, beneath densely woolly-tomentose with pale hairs, 5 to 8 cm long, 3 to 5 cm wide. Cymes sessile or subsessile, axillary, pubescent, 3 cm in diameter or less. Flowers greenish-white, about 7 mm in diameter. Petals subspatulate, concave, reflexed. Ovary 2-celled. Fruit fleshy, ovoid or subglobose, 1.5 to 2 cm in diameter, edible. (Fl. Filip. *pl. 57.*)

Occasional in gardens and along roadsides, introduced, fl. July–Sept. A native of tropical Asia now distributed from Affghanistan to China, through Malaya to Australia, often in cultivation only.

2. **Z. trinervia** (Cav.) Poir. Duclap (Tag.).

An erect shrub or small tree, frequently with pendudous branches, rusty-pubescent, the trunk with large pyramidal spines. Leaves densely pubescent, ovate, 5 to 10 cm long, acute or acuminate, base very strongly inequilateral. Cymes short, axillary, solitary, peduncled, pubescent. Flowers greenish-white or greenish-yellow, about 4 mm in diameter. Fruit globose, glabrous, 1 to 1.5 cm in diameter, green, the pulp rather hard, the stone bony, 4-celled. (Fl. Filip. *pl. 433, Z. lotus.*)

In thickets, dry hills near the city, fl. June–Nov.; common and widely distributed in the Philippines. Endemic.

3. **Z. zonulata** Blanco. Ligaa (Tag.).

A tree, sometimes reaching a height of 25 m, more or less rusty-pubescent, the trunk with large pyramidal spines. Leaves ovate to oblong-ovate, acuminate, base rounded or subcordate, equilateral or slightly inequilateral, pubescent, in age often becoming glabrous or nearly so, 8 to 15 cm long. Cymes axillary, peduncled, pubescent, up to 5 cm long. Flowers greenish-yellow, fragrant, 5 to 6 mm in diameter. Fruit globose, 1.5 to 2 cm in diameter, rusty-pubescent, the pericarp much wrinkled when dry, the bony stone 2-celled.

Old botanical garden, fl. Sept.–Nov.; widely distributed in the Philippines. Endemic.

2. GOUANIA Linnaeus

Unarmed climbing shrubs with alternate leaves. Flowers polygamous in axillary or terminal spikes or spike-like racemes, the rachis often tendril-bearing at or near the base. Flowers small. Calyx superior, 5-fid, the tube short, obconic. Petals 5, inserted below the margin of the disk, hooded. Stamens 5, enfolded by the petals. Disk filling the calyx-tube, 5-angled. Ovary sunk in the disk, 3-celled; style 3-cleft. Fruit an inferior, coriaceous, dehiscent capsule, crowned by the persistent calyx-limb, 3-angled or 3-winged. (In honor of A. Gouan, a French botanist.)

Species between 30 and 40, chiefly in tropical America, few in Africa, Asia, and Malaya, 2 in the Philippines.

1. **G. microcarpa** DC. Litiran (Tag.).

A scandent shrub, the younger parts and inflorescence pubescent. Stems slender. Leaves ovate, acuminate, base broad and rounded or subcordate, margins nearly entire or crenate-serrate, 6 to 11 cm long. Spikes terminal and axillary, slender, pubescent, up to 20 cm in length, the rachis usually cirrhose near the base, the flowers crowded in scattered, often short-peduncled heads or clusters. Flowers white, about 2 mm long, pubescent outside. Fruit about 5 mm long, 3-angled, angles slightly winged, glabrous or nearly so.

In thickets, Masambong, fl. Dec.–Feb.; widely distributed in the Philippines. India to Malaya.

3. COLUBRINA L. C. Richard

Erect or climbing shrubs with alternate, toothed, 3-nerved leaves. Cymes axillary, short. Flowers small, perfect, regular. Calyx 5-toothed or lobed, the tube short, broad. Petals 5, clawed, hooded, inserted on the margin of the disk. Stamens 5. Disk fleshy, filling the calyx-tube. Ovary 3-celled, sunk in the disk and confluent with it; style 3-cleft. Fruit a tardily dehiscent, globose, 3-celled, 3-seeded capsule, surrounded below with the accrescent calyx-tube. (Latin "snake" from the fancied resemblance of the twining stems of some species.)

Species about 15, chiefly in tropical America, 1 in the Philippines.

1. **C. asiatica** (L.) Brongn. Cabatiti (Tag.).

A scandent glabrous shrub reaching a height of 6 m. Leaves shining, ovate, acuminate, base rounded, margins crenate-serrate, 5 to 9 cm long, 2 to 6 cm wide, 3-nerved from the base. Cymes axillary, short, 1 cm long or less, shorter than the petioles. Flowers pedicelled, yellowish-green, about 4 mm in diameter. Fruit subglobose, 7 to 9 mm in diameter, surrounded at the base by the calyx, tardily dehiscent, crustaceous, 3-seeded.

In thickets along the beach, Pasay, fl. May–Aug.; throughout the Philippines near the seashore. India to Malaya and Australia, and in southern Africa.

82. VITACEAE (GRAPE OR AYO FAMILY)

Erect shrubs, or vines climbing by means of tendrils, the stems cylindric, angled, or compressed. Leaves alternate, simple and toothed or lobed, digitately or pedately 3- to 9-foliolate, or 1- to 3-pinnate. Flowers regular, perfect or unisexual, cymose, the cymes umbellately, paniculately, or racemosely arranged. Calyx small, entire, or 4- or 5-toothed. Petals 4 or 5, free or cohering, valvate. Stamens 4 or 5, opposite the petals, inserted at the base of the disk or between its lobes; anthers free or connate, extrorse. Disk free or connate with the stamens or ovary. Ovary 2- to 6-celled; style short or none; ovules 1 or 2 in each cell. Fruit a 1- to 6-celled berry.

Genera 12 or more, species more than 500, in all parts of the world, 6 genera and about 40 species in the Philippines.

1. Tendril-bearing vines with simple, pedately, or palmately compound leaves.
    2. Stigma 4-lobed; leaves (in our species) 5-foliolate........ 1. *Tetrastigma*
    2. Stigma entire, small; leaves (in our species) simple or 3-foliolate. 2. *Cissus*
1. Erect shrubs or small trees without tendrils, the leaves large, pinnately compound........ 3. *Leea*

1. TETRASTIGMA Planchon

Climbing, more or less woody vines, tendril-bearing, the leaves usually pedately 5-foliolate, sometimes 3- or 1-foliolate. Flowers small, 4-merous, polygamo-dioecious, in axillary corymbose cymes, usually puberulent. Petals 4, usually mucronate near the apex, spreading in flower. Disk adnate to the base of the ovary. Ovary 2-celled, the cells 2-ovuled; style very short; stigma usually 4-lobed. Fruit a fleshy, 2- to 4-seeded berry. (Greek "four" and "stigma.")

Species about 45 in the Indo-Malayan region, 5 or 6 in the Philippines.

1. **T. harmandii** Planch. Ayo (Tag.).

A vine reaching a length of 10 m, the stems somewhat compressed, woody, rough, 1 to 2.5 cm in diameter. Tendrils simple. Leaves mostly pedately 5-foliolate, some 3-foliolate and some rarely 7-foliolate on the same plant. Leaflets elliptic-oblong, acuminate, distantly toothed, shining, glabrous, 5 to 12 cm long. Inflorescence cymose axillary, solitary, short-peduncled, puberulent, 4 to 10 cm long and wide. Flowers pale-green, faintly fragrant, numerous, umbellately disposed on the ultimate branchlets, short-pedicelled. Calyx very small. Petals 4, oblong, about 3.5 mm long, puberulent on the back. Fruit globose, fleshy, glabrous. (Fl. Filip. *pl. 398, Cissus pedata.*)

In dry thickets La Loma to Pasay, sometimes cultivated, fl. Feb.–Apr.; widely distributed in the Philippines. Indo-China.

2. CISSUS Linnaeus

Climbing, suffrutescent, herbaceous, or somewhat woody, tendril-bearing vines, with simple, or 3- to 5-foliolate leaves. Cymes corymbose, usually leaf-opposed. Flowers perfect, 4-merous. Petals 4, spreading in flower, rarely adnate and falling as a whole. Disk 4-lobed, adnate to the base of the ovary. Ovary 2-celled, the cells usually 2-ovuled; style subulate; stigma entire; fruit a fleshy 1- to 4-seeded berry. (The Greek name for the ivy.)

Species about 220 in the tropics of both hemispheres, about 15 in the Philippines.

1. Leaves simple.
    2. Stems thick, fleshy, sharply 4-angled........ 1. *C. quadrangularis*
    2. Stems terete.

3. Younger parts, at least, ferruginous-pubescent............ 2. *C. assamica*
3. Entirely glabrous.. 3. *C. repens*
1. Leaves trifoliolate.. 4. *C. trifolia*

1. C. QUADRANGULARIS L.

A glabrous vine, the stems fleshy, green, sharply 4-angled, 1 to 1.5 cm thick, much contracted at the nodes, the internodes 6 to 10 cm long. Leaves few, 1 from each node, alternate, 4 to 6 cm long, simple, somewhat fleshy, broadly ovate or triangular-reniform, distantly toothed with small appressed sharp teeth, apex obtuse, base broad, cordate or subtruncate. Cymes small, axillary, peduncled, up to 5 cm long. Flowers pinkish, about 2.5 mm long. Berry globose, fleshy, succulent.

In dry thickets etc., San Juan del Monte, fl. Sept.–Oct., and probably in other months; of local occurrence in the Philippines, certainly introduced. Tropical East Africa, tropical Asia and Malaya.

2. C. aristata Bl. Salápong (Tag.).

A scandent vine reaching a height of at least 10 m, more or less ferruginous-pubescent. Leaves ovate, shortly acuminate, base deeply cordate or the upper ones rounded, margins distinctly cuspidate-serrate, 8 to 18 cm long, 5 to 12 cm wide. Cymes peduncled, trichotomous, 2.5 to 5 cm long. Flowers greenish, purple-tinged, subumbellately arranged on the ultimate branchlets, pedicelled. Petals 4, valvate, oblong-ovate, acute, nearly 3 mm long. Fruit globose, fleshy, purple when mature, about 1 cm in diameter when fresh, containing a single large seed. (Fl. Filip. *pl. 318, C. nodosa.*)

In thickets, Pasay, San Pedro Mácati, etc., scattered, fl. Aug.–Dec.; widely distributed in the Philippines. India, through Malaya to New Guinea.

3. C. repens Lam. Ayong-gala (Tag.).

A vine reaching a length of 10 m or less, quite glabrous. Stems terete, green, somewhat fleshy, readily breaking up at the nodes when dry. Leaves simple, 7 to 12 cm long, broadly ovate, acuminate, base broadly cordate, margins with distant, small, sharp, appressed teeth, the nerves usually 4 or 5 pairs. Cymes leaf-opposed and forming terminal leafy inflorescences, the individual cymes shorter than the petioles. Flowers 4-merous, greenish, small, umbellately arranged. Fruits fleshy, purple, obovoid, usually apiculate, about 6 mm long, very acrid, with a single seed.

In dry thickets, Diliman, fl. Aug.–Nov.; widely distributed in the Philippines. India to southern China and Malaya.

4. C. trifolia (L.) K. Sch. (*C. carnosa* Lam.). Calit-calit (Tag.).

Scandent, puberulent or becoming glabrous or nearly so. Leaves trifoliolate, the petioles 2 to 3 cm long; tendrils opposite the leaves. Leaflets ovate to oblong-ovate, 2 to 8 cm long, 1.5 to 5 cm wide, slightly acuminate, rather coarsely toothed. Cymes long-peduncled, axillary, solitary, usually 3-branched. Flowers small, greenish-white. Fruit fleshy, subglobose, dark-purple or black, about 1 cm in diameter. (Fl. Filip. *pl. 24, C. acida.*)

In thickets and waste places, fl. all the year; throughout the Philippines. India and Ceylon through Malaya to New Caledonia.

In addition to the species above considered, the grape vine (Sp. *uva*=*Vitis vinifera* L.) is occasionally found in cultivation, but it rarely produces flowers or fruit here.

LEEA Linnaeus

Shrubs or small trees with alternate, large, 1- to 4-pinnate rarely simple leaves, the petiole dilated and sheathing at the base; leaflets ovate to oblong-lanceolate, toothed. Inflorescence opposite the upper leaves, corymbosely cymose, often very large. Flowers red, yellow, or green. Calyx 5-, rarely 4-toothed. Petals as many as the calyx-teeth, connate below and adhering to the staminal-tube, free parts revolute. Stamens united at the base into a 5-toothed tube, the filaments inserted between the teeth, inflexed; anthers free and exserted, or connate and included. Ovary 3- to 6-celled; cells 1-ovuled. Fruit a 3- to 6-celled and seeded, succulent or rather dry, subglobose berry. (In honor of J. Lee, a Scotch horticulturist.)

Species about 50, tropical Asia, Africa, and Malaya, few in Australia, about 14 in the Philippines.

1. **Leea manillensis** Walp. Caliantan (Tag.); Amamali (Vis.).

A shrub or small tree 3 to 6 m high, glabrous or nearly so. Leaves 50 to 80 cm long, 3- or 4-pinnately compound, the rachis and branches somewhat jointed; leaflets elliptic-ovate to oblong-lanceolate, acuminate, 6 to 15 cm long, sharply serrate. Inflorescence large, red, of dichotomous corymbose cymes, many-flowered, up to 50 cm in diameter. Flowers 5-merous, about 3 mm long, few opening at a time, the pedicels and calyx red, the petals pale-yellow. Fruit dark-red, depressed-globose, about 8 mm in diameter. (Fl. Filip. *pl. 60, L. sambucina.*)

In thickets, Pasay, Guadalupe, etc., fl. Apr.–June; widely distributed in the Philippines. Endemic.

83. TILIACEAE (LINDEN OR ANILAO FAMILY)

Herbs, erect or scandent shrubs, or trees. Leaves alternate, simple, entire, toothed, or lobed. Inflorescence axillary or terminal, the flowers solitary, fascicled, umbellate, cymose, or panicled. Flowers regular, perfect. Sepals 3 to 5, free, valvate. Petals as many as the sepals, rarely absent. Stamens mostly numerous, springing from a dilated torus or disk. Ovary superior, free, 2- to 10-celled. Fruit fleshy or dry, dehiscent or indehiscent, 1- to many-seeded.

Genera about 36, species about 400, in most parts of the world, but chiefly tropical, 11 genera and about 45 species in the Philippines.

1. Shrubs or trees, sometimes climbing; fruit indehiscent.
   2. Flowers fascicled, umbellate, or paniculate; fruit a fleshy or fibrous drupe........ 1. *Grewia*
   2. Flowers paniculate; fruit a 3- to 5-winged capsule........ 2. *Columbia*
   2. Flowers solitary or in pairs; fruit a fleshy, many-seeded berry. 3. *Muntingia*
1. Suffrutescent herbs or undershrubs; fruit dry, dehiscent.
   2. Capsules prickly........ 4. *Triumfetta*
   2. Capsules not prickly........ 5. *Corchorus*

1. GREWIA Linnaeus

Erect or scandent shrubs or trees, more or less stellate-pubescent. Leaves toothed or entire, base 3-nerved or nerves often more numerous. Flowers axillary, fascicled or umbelled, or sometimes in terminal panicles. Sepals 5, free. Petals 5, glandular at the base, sometimes wanting. Stamens many, on a raised torus. Ovary 2- to 4-celled. Drupe fleshy or fibrous, entire or 2- to 4-lobed. (In honor of Dr. N. Grew, an English physician and botanist.)

Species 70 or more, tropics of the Old World, about 20 in the Philippines, one in our area.

1. **G. multiflora** Juss. Danglin (Tag.).

A shrub or small tree 3 to 8 m high, glabrous or nearly so. Leaves oblong-ovate to elliptic-ovate, 4 to 14 cm long, 2.5 to 5 cm wide, often somewhat inequilateral, base usually rounded, 3-nerved, apex acuminate, margins crenate-serrate. Inflorescence of small, axillary, solitary umbels, the peduncles longer then the petioles, each with from 2 to 7 flowers. Buds globose or ovoid. Flowers about 1 cm in diameter, greenish-yellow. Sepals pubescent outside, much longer than the petals. Fruit obovoid, about 6 mm long.

In thickets, San Juan, Guadalupe, etc., fl. Sept.–Dec.; throughout the Philippines. India to Africa, and Malaya.

2. COLUMBIA Persoon

Trees or shrubs with simple, usually oblique leaves. Flowers in terminal panicles. Sepals 5, distinct. Petals 5, glandular at the base. Stamens many, free, inserted on a raised torus. Ovary 3- to 5-celled, the cells 2- to 4-ovuled; style subulate, entire. Capsule rounded to obovoid, 3- to 5-winged, ultimately splitting into 3 to 5 1-seeded, indehiscent cocci. (In honor of Christopher Columbus, discoverer of America.)

Species about 18, tropical Asia and Malaya, about 10 in the Philippines.

1. **C. serratifolia** (Cav.) Pers. Anilao (Tag.).

A shrub or small tree 3 to 10 m high, the branches and inflorescence hirsute. Leaves oblong-ovate to oblong-lanceolate, acuminate, 10 to 20 cm long, base very oblique, margins coarsely or finely serrate, the upper surface becoming nearly glabrous, the lower surface pale, rather densely pubescent and hirsute. Panicles terminal and in the upper axils, many-flowered, 10 to 30 cm long. Flowers clustered, 6 to 7 mm long. Sepals pubescent. Petals pink and yellowish or reddish. Capsules about 1 cm long, broader than long, 3- or 4-winged. (Fl. Filip. *pl. 272*, *C. anilao.*)

In thickets near San Francisco del Monte, fl. May–July; widely distributed in the Philippines. Endemic.

3. MUNTINGIA Linnaeus[1]

A stellate-pubescent tree with alternate, toothed, inequilateral, distichous leaves. Flowers white, solitary or in pairs, their pedicels inserted just above the leaf-axils. Sepals 5, lanceolate, valvate. Petals entire, obovate. Stamens indefinite, free, inserted on an annular subperigynous disk. Ovary 5- to 7-celled, ovoid, surrounded by a dense ring of white hairs. Stigma subsessile, thick, sulcate-lobed. Fruit a fleshy, globose, many-seeded berry. (In honor of A. Munting, a Dutch botanist.)

A single species in Mexico and South America.

1. **M. CALABURA** L. Datiles, Ratiles (Tag., corruption of Sp. *datil*=date.)

A tree 5 to 10 m high, viscid-pubescent with stellate hairs, the branches spreading. Leaves alternate, distichous, oblong-ovate to broadly oblong-lanceolate, 8 to 13 cm long, acuminate, toothed, base inequilateral, one side rounded, the other acute; stipules slender, hairy, short, deciduous. Flowers 2 cm in diameter, white, extra-axillary, solitary or in pairs, their pedicels erect, 1.5 to 2.5 cm long. Sepals 5, green, reflexed, lanceolate, long-acuminate, 1 cm long. Petals obovate, deciduous, 1 cm long, spreading. Stamens many. Fruit a globose, red, smooth, very fleshy, sweet berry, about 1.5 cm in diameter, filled with very numerous, small seeds. (Fl. Filip. *pl. 425.*)

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[1] Placed in the *Elaeocarpaceae* in the "Natürlichen Pflanzenfamilien."

Common in and about Manila, fl. all the year. A native of tropical America, introduced here and naturalized; also introduced in Siam. The very sweet fruits are much eaten by children.

4. TRIUMFETTA Linnaeus

Erect or prostrate branched herbs or undershrubs, more or less stellate-pubescent. Leaves toothed, simple or lobed. Flowers yellow, in dense axillary cymes or fascicles. Sepals and petals 5, free. Stamens 5 to 35, springing from a lobed torus. Ovary 2- to 5-celled, cells 2-ovuled. Capsule globose, covered with short or long, often hooked spines, dehiscent or indehiscent. (In honor of G. B. Trionfetti, and Italian botanist.)

A genus of about 40 species of wide tropical distribution, about 6 in the Philippines, two in our area.

Inflorescence rather dense; spines of the fruits glabrous .... 1. *T. bartramia*
Inflorescence rather lax; spines of the fruits with reflexed hairs.
2. *T. semitriloba*

1. T. BARTRAMIA L. (T. *rhomboidea* Jacq.). Calot-calotan (Tag.).

An erect, more or less hairy, branched, annual, often suffrutescent herb, 0.5 to 1.5 m high. Leaves variable, usually orbicular or rhomboid-ovate, base rounded, apex 3-lobed, denticulate, the upper ones much reduced, oblong to ovate-lanceolate, not lobed. Flowers yellow, about 6 mm long, numerous, in rather dense axillary fascicles. Fruit small, globose, pubescent, covered with hooked spines, the spines glabrous.

In waste lands, fl. Oct.–Feb.; widely distributed in the Philippines, but undoubtedly introduced here. Tropical Asia, Africa, and Malaya.

2. T. SEMITRILOBA Jacq. Calot-calotan (Tag.).

An erect, branched, suffrutescent or shrubby plant, 1 to 2 m high, more or less stellate-pubescent. Leaves 3 to 10 cm long, broadly ovate to ovate, or the upper ones oblong, base usually broad, rounded, or of the upper ones acute, subentire, or slightly 3-lobed in the upper part, margins toothed. Flowers yellow, in rather lax axillary clusters, the buds oblong, up to 9 mm long. Sepals apiculate. Fruits globose, 7 to 8 mm in diameter, pubescent, covered with hooked spines, the spines with scattered, reflexed hairs.

In open dry lands, thickets, etc., fl. Dec.–Feb.; widely distributed in the Philippines, but undoubtedly introduced here. Tropics generally.

5. CORCHORUS Linnaeus

Erect or spreading, branched, often suffrutescent herbs, nearly glabrous or more or less stellate-pubescent. Leaves simple, with usually 2 short, tail-like appendages at the base. Flowers small, yellow, axillary. Sepals and petals 4 or 5. Stamens usually many, springing from a short torus. Ovary 2- to 6-celled. Capsule elongated or subglobose, loculicidally 2- to 5-valved. (An old Greek name for some bitter plant.)

Species about 35, mostly widely distributed in the tropics, 3 in the Philippines.

1. Capsule globose, not beaked .... 1. *C. capsularis*
1. Capsule elongated, beaked.
  2. Capsule 6- to 8-ribbed or winged, beak 3-fid .... 2. *C. acutangulus*
  2. Capsule cylindric, 10-ribbed, beak entire .... 3. *C. olitorius*

1. C. CAPSULARIS L. Pasao, Pasao na bilog (Tag.); Jute.

An erect, branched, glabrous, annual herb, 1 to 2 m high, the stems usually purplish. Leaves ovate-lanceolate, 5 to 12 cm long, slenderly acuminate, base rounded, tailed, margins sharply serrate; stipules linear, 5 to 8 mm long. Flowers axillary, few in each axil, about 4 mm long, the sepals often purplish, the petals yellow. Capsules globose to globose-obovoid, about 1 cm in diameter, longitudinally ridged, prominently rugose, muricate, 5-valved.

In open, low grass lands and waste places, fl. Oct.–Jan., but never cultivated here; widely distributed in the Philippines, but probably introduced. A native of India, now wild or cultivated in many other tropical countries.

2. C. ACUTANGULUS Lam.

A low, diffusely branched, suffrutescent annual, usually less than 0.5 m high, the branches elongated, often spreading along the surface of the ground, the stems reddish-brown, somewhat hairy. Leaves oblong-ovate, finely toothed, acute, base rounded or slightly cordate, usually 2-tailed. Flowers axillary, yellow, about 5 mm long. Capsule 2 to 3 cm long, 4 to 6 mm thick, narrowly oblong, prominently longitudinally 6- to 8-ridged or winged, apex with 3 or 4, erect or divergent beaks. (Fl. Filip. *pl. 141.*)

In open waste places, fl. Aug.–Jan.; throughout the Philippines, but probably introduced. Tropical Asia to Malaya and Africa; also in the West Indies.

3. C. OLITORIUS L. Tagabang, Pasao (Tag.); Jute.

An erect, branched, glabrous or nearly glabrous suffrutescent annual, 1 to 1.5 m high. Leaves ovate-lanceolate, 5 to 12 cm long, acuminate, base tailed, margins toothed. Flowers axillary, about 6 mm long, the petals yellow. Capsules elongated, cylindric, 10-ribbed, 3 to 3.5 cm long, 3- or 6-valved, valves with transverse partitions between the seeds, beaked.

In open, usually damp or wet lands, fl. Oct.–Jan.; widely distributed in the Philippines, but probably introduced. A native of India, now found in most tropical countries.

84. MALVACEAE (HIBISCUS OR GOMAMELA FAMILY)

Herbs, shrubs, or trees, rarely scandent. Leaves simple, alternate, and with the herbaceous parts often stellate-pubescent; stipules free, sometimes caducous. Bracteoles 3 or more, whorled at the base of the calyx, or wanting. Flowers axillary or terminal, solitary or panicled, regular, perfect. Sepals 5, free or connate. Petals 5. Stamens many, rarely few, the filaments connate into a staminal-tube which is more or less adnate to the base of the petals, the anthers various. Ovary 2- to many-celled, entire or lobed, of 2 to 5 or more carpels arranged in a whorl around a central axis. Fruit of dry cocci separating from the axis, or capsular and loculicidal.

Genera 33, species about 725 of wide tropical and temperate distribution, 11 genera and 40 species in the Philippines.

1. Fruit composed of carpels separating from the central axis when mature.
  2. Styles as many as the carpels.
    3. Ovules solitary; corolla less than 1.5 cm in diameter.
      4. Carpels with 3 short spines; ovules ascending........ 1. *Malvastrum*
      4. Carpels with 2 awns or awnless; ovules pendulous................ 2. *Sida*
    3. Ovules 2 or more.. 3. *Abutilon*
  2. Styles or branches of the stigmas twice as many as the carpels.
    3. Flowers fascicled, axillary; coarse erect herbs................ 4. *Malachra*
    3. Flowers solitary.
      4. Bracteoles 5; fruit of 5 spiny carpels.. 5. *Urena*
      4. Bracteoles more than 5; flowers red; carpels connate into a somewhat fleshy fruit; cultivated only.............................. 6. *Malvaviscus*
1. Fruit capsular, dehiscent, or subindehiscent.
  2. Stigmas spreading.
    3. Cells of ovary 1-ovuled; spreading herbs..................... 7. *Kosteletzkya*
    3. Cells of the ovary 2- to many-ovuled; erect herbs, or shrubs or trees.
      4. Calyx spathe-like, splitting down one side and circumscissly deciduous.. 8. *Abelmoschus*
      4. Calyx regularly lobed, persistent.. 9. *Hibiscus*
  2. Stigmas coherent in a club-shaped mass.
    3. Bracteoles 3 to 5, small.. 10. *Thespesia*
    3. Bracteoles 3, very large.. 11. *Gossypium*

1. MALVASTRUM A. Gray

Herbs or undershrubs, the leaves toothed. Flowers yellow, axillary and terminal. Calyx cup-shaped, 5-parted. Petals longer than the sepals. Staminal-tube anther-bearing at the summit, with no sterile teeth; anthers numerous. Ovary 5-celled or more; styles as many as the carpels. Ripe carpels separating from the short torus, indehiscent, 1-seeded, beaked or not (From *Malva* another genus of the family.)

Species about 60, all American and South African, 2 widely distributed as weeds, 1 in the Philippines.

1. **M. COROMANDELINUM** (L.) Garcke (*M. tricuspidatum* A. Gray). Quinalumpang (Tag.).

An erect, somewhat hairy, branched, suffrutescent, perennial plant 1 m high or less. Leaves oblong to ovate-lanceolate, obtuse, base usually rounded, irregularly toothed, 2 to 5 cm long. Flowers axillary and terminal. Calyx green, about 7 mm long, the lobes lanceolate, acuminate. Corolla yellow, the petals about 8 mm long. Fruit consisting of from 8 to 12, reniform, compressed, hirsute carpels 2 to 3 mm long, each carpel with 3 short straight awns. (Fl. Filip. *pl. 251, M. ruderale.*)

Abundant in waste places, fl. all the year, introduced; throughout the Philippines. A native of tropical America, now widely distributed in the tropics.

2. SIDA Linnaeus

Erect, branched, suffrutescent herbs or undershrubs, or trailing herbs, more or less stellate-pubescent or nearly glabrous. Leaves simple or somewhat lobed, toothed. Flowers axillary. Calyx-lobes 5, valvate. Petals yellow, free above, connate below and adnate to the staminal-tube. Stamens numerous, free above. Carpels 5 or more, the ripe ones separating from the axis and pointed, or more usually 2-awned at the summit. (A Greek plant name.)

Species 80 or more, of wide tropical distribution, most of them weeds, about 9 in the Philippines.

1. A slender, prostrate, spreading herbaceous plant.................. 1. *S. javensis*
1. Erect branched undershrubs or suffrutescent herbs.
  2. Leaves cordate at the base; plant glutinous-pubescent or velvety-pubescent with long hairs intermixed.
    3. Carpels smooth, awnless or nearly so; a rank-smelling, glutinous-pubescent herb.. 2. *S. mysorensis*
    3. Carpels prominently rugose, long-awned, velvety-pubescent with intermixed long hairs.. 3. *S. cordifolia*
  2. Leaves not cordate; plants stellate-pubescent or nearly glabrous.
    3. Leaves lanceolate, acuminate, green on both surfaces, nearly glabrous; pedicels not or but little longer than the flowers.. 4. *S. acuta*
    3. Leaves not lanceolate, obtuse, retuse, or acute, pale beneath.
      4. Leaves oblong to rhomboid, acute or rounded; pedicels elongated; carpels usually not beaked....................................... 5. *S. rhombifolia*
      4. Leaves obovate-oblong to obovate, base cuneate, apex retuse, truncate, or rounded; pedicels short; carpels beaked......... 6. *S. retusa*

1. **S. JAVENSIS** Cav. Colotang-baguing (Tag.).

A trailing herbaceous plant, the stems up to 60 cm in length, with scattered stellate hairs or nearly glabrous. Leaves orbicular-ovate, 2 to 7 cm long, acute or slightly acuminate, base prominently cordate, margins coarsely toothed, sometimes obscurely lobed. Peduncles axillary, solitary, elongated, jointed in the middle. Calyx green, about 5 mm long, the segments triangular, acute or acuminate. Corolla yellow, about 7 mm in diameter. Carpels 5, each 2-awned at the apex, the awns slender, nearly as long as the carpels.

In thickets, roadsides etc., fl. Oct.–March; widely distributed in the Philippines, and certainly not indigenous. India and Malaya, perhaps in other tropical countries.

2. **S. MYSORENSIS** Wight. & Arn. Marbas, Marabas, Marbas-gubat (Tag., corr. Sp. *malvas*=mallow).

An erect, branched, rank-smelling, glutinous-pubescent herb 0.3 to 1 m high. Leaves broadly ovate, cordate, acuminate, crenate, 5 to 8 cm long, the upper ones usually much reduced and oblong to oblong-ovate. Flowers axillary, solitary or in pairs, slenderly pedicelled. Calyx green, pubescent. Corolla yellow, about 1 cm in diameter. Carpels 5, about 2.5 mm long, not reticulate, obtuse, scarcely or not at all awned.

In thickets and fallow lands, La Loma, San Pedro Macati, etc., fl. Oct.–Mar.; widely distributed in Luzon, and certainly not indigenous. India and Ceylon.

3. **S. CORDIFOLIA** L.

An erect suffrutescent herb 0.4 to 1 m high, densely pubescent and with intermixed, long, spreading hairs. Leaves ovate, 1.5 to 4.5 cm long, obtuse, cordate at the base, prominently dentate-serrate, densely pubescent on both surfaces. Flowers yellow, axillary, often crowded on the younger branches forming leafy racemes, the calyx densely pubescent. Carpels prominently rugose, the awns about as long as the carpels.

In open waste places, fl. most of the year; common and widely distributed in the Philippines, but certainly introduced here. Tropics generally.

4. S. ACUTA Burm. (*S. carpinifolia* L.). Ualisualisan, Escobang-haba (Tag.).

An erect, branched, slightly pubescent or nearly glabrous, suffrutescent herb or undershrub less than 1 m high. Leaves lanceolate, acute or acuminate, serrate, base rounded or obtuse, 3 to 5 cm long, pale-green, of the same color on both surfaces, the stipules linear-lanceolate, longer than the petioles. Flowers axillary, solitary or in pairs, the pedicels short, jointed near the middle. Calyx green. Corolla yellow, about 1.3 cm in diameter. Carpels 4 to 9, enclosed by the calyx, about 3.5 mm long, rugose, 2-awned. (Fl. Filip. *pl. 366.*)

In open waste places, very common, fl. all the year; throughout the Philippines about towns, undoubtedly introduced. Tropics generally.

5. S. RHOMBIFOLIA L. Ualisualisan (Tag.).

An erect, branched, shrubby plant 0.5 to 1.3 m high. Leaves oblong to rhomboid, 1 to 4 cm long, acute or rounded, serrate, pale and stellate-puberulent beneath, the stipules setaceous, as long as the petiole. Flowers axillary, solitary, their pedicels slender, elongated, jointed above the middle, in fruit about 1.5 cm long. Calyx green. Corolla yellow, 1.5 to 1.8 cm in diameter. Carpels 8 to 10, nearly smooth or somewhat rugose, about 2.5 mm long, not awned, enclosed by the calyx. (Fl. Filip. *pl. 248, S. philippica.*)

In open waste places, common, fl. all the year; throughout the Philippines in and about towns, certainly introduced. Tropics generally.

6. S. RETUSA L.

An erect, stiff, branched undershrub usually less than 0.5 m high. Leaves oblong-obovate to obovate, apex retuse, truncate, or rounded, usually broad, base cuneate, 1 to 2 cm long, toothed, pale and densely stellate-pubescent on the lower surface. Flowers axillary, solitary, usually short-pedicelled, yellow, about 1.5 cm in diameter. Carpels beaked, smooth or only slightly rugose.

In open dry grass lands, fl. all the year; widely distributed in the Philippines, but certainly introduced here. Tropics generally.

3. ABUTILON Gaertner

Erect, suffrutescent herbs or undershrubs more or less downy-pubescent, grayish. Leaves cordate, ovate, or somewhat lobed. Flowers axillary or terminal, the bracteoles none. Calyx tubular below, cleft into 5 valvate sepals. Petals 5, connate below and adnate to the staminal-tube. Staminal tube divided above into many filaments. Carpels 5 to many; styles as many as the carpels. Ripe carpels separating from the axis, awned or not. (Said to be from an Arabian name alluding to the yellow flowers.)

Species about 70, in most tropical and subtropical countries, 2 or 3 in the Philippines.

1. A. INDICUM (L.) G. Don. Guiling-guilingan (Tag.); Malvas, Marbas (Sp.-Fil.).

An annual or perennial, suffrutescent, erect, branched plant 0.5 to 2.5 m high. Leaves orbicular-ovate to broadly ovate, 5 to 12 cm long, nearly as wide, base prominantly cordate, apex shortly acuminate, margins entire or irregularly toothed, both surfaces softly ashy-puberulent. Flowers axillary, solitary, the peduncles long, jointed near the tip. Calyx green. Corolla yellow, 2 to 2.5 cm in diameter. Fruits about 1.5 cm long, 2 cm in diameter, composed of from 15 to 20, somewhat pubescent, shortly awned carpels. (Fl. Filip. *pl. 337.*)

In waste places, rather common, fl. all the year; throughout the Philippines, but certainly introduced. Tropics generally.

4. MALACHRA Linnaeus

Erect, branched, coarse, hairy, annual herbs. Flowers in axillary fascicles, usually intermixed with bracteoles. Calyx-tube cup-shaped, the lobes 5. Petals 5, free above, coherent below, and connate with the base of the staminal-tube. Staminal-tube truncate or 5-toothed, the filaments numerous. Carpels 5, 1-ovuled; styles 10. Ripe carpels indehiscent, separating from the axis, smooth. (From the Latin for "mallow.")

Species 5 or 6 in tropical America, 1 now introduced in many other tropical countries, 2 in the Philippines.

Leaves not lobed; flowers usually yellow .... 1. *M. capitata*
Leaves deeply palmately cut into 5 narrow lobes; flowers pink.
2. *M. fasciata*

1. M. CAPITATA L. Paang-baliuis (Tag.).

A coarse, erect, simple or branched, annual herb 0.5 to 2 m high, coarsely hairy. Leaves suborbicular, obscurely and shallowly-lobed, finely toothed, base somewhat cordate, 5 to 15 cm in diameter, the stipules linear. Flowers in axillary and terminal heads, the bracteoles foliaceous, up to 1.5 cm long. Calyx-lobes short, slenderly acuminate. Petals yellow, imbricate, about 1 cm long. (Fl. Filip. *pl. 295.*)

In waste places, common, fl. Sept.–Feb.; throughout the Philippines. A native of tropical America, now widely distributed in tropical countries.

2. M. FASCIATA Jacq. Paang-baliuis (Tag.).

A stout, erect, more or less branched, hirsute herb 0.5 to 1 m high. Leaves 10 to 15 cm long, cut nearly to the base into 5 linear or oblong-linear lobes 5 to 15 mm wide, the outer ones much shorter than the inner, base obtuse or rounded. Flowers fascicled, axillary or on short axillary branches, each fascicle more or less enclosed by leafy bracts, the bracts with basal, elongated, linear lobes. Corolla pink, about 1 cm long.

Abundant in waste places, fl. Sept.–Jan. A native of tropical America, now common and widely distributed in the Philippines, but not reported elsewhere in the Orient.

5. URENA Linnaeus

Erect branched herbs or undershrubs, stellate-pubescent. Leaves ovate to orbicular, palmately lobed or angled. Flowers axillary, pink. Bracteoles 5, adnate to the 5-cleft calyx. Petals 5, free above, connate below and adnate to the staminal-tube. Staminal-tube truncate or minutely toothed; anthers many, nearly sessile. Ovary 5-celled, cells 1-ovuled; branches of the stigma 10. Ripe carpels covered with hooked bristles, indehiscent, separating from the axis when ripe. (From the Malabar name.)

Species 4 or 5, of wide tropical distribution, several forms of one species in the Philippines.

1. U. LOBATA L. Calut-calutan (Tag.).

An erect, branched, shrubby plant 0.6 to 2.5 m high, exceedingly variable, more or less pubescent. Leaves pale beneath, ovate to suborbicular, 3 to 9 cm long, cordate, more or less toothed, or somewhat lobed or angled, the lobes not extending beyond the middle of the leaf, the sinuses usually broad, acute. Flowers axillary, solitary or somewhat fascicled, pink, about 1.7 mm in diameter. Fruit depressed-globose, about 7 mm in diameter, the 5 carpels covered with short, retrorsely barbed spines. (Fl. Filip. *pl. 243, U. multifida.*)

In waste places, fl. all the year; throughout the Philippines. Tropics generally, but certainly an introduced plant in the Philippines.

Var. SINUATA (L.) Gagnepain. (*U. sinuata* L.).

Very similar to the preceding and certainly not specifically distinct, differing in most of its leaves being deeply and often narrowly subpalmately lobed, the sinuses extending beyond the middle of the leaf, rounded, often narrow. Flowers and fruits as in the species. All intergrading leaf-forms are often found on the same plant.

More abundant in the vicinity of Manila than is *U. lobata* and with the same habitat, and Philippine and extra-Philippine range.

Var. SCABRIUSCULA (DC.) A. Gray.

Similar to the species, but the leaves with very broad and shallow lobes, both surfaces rather densely hirsute, the lower surface much paler than the upper, the branchlets and inflorescence ferruginous pubescent.

In waste places near Fort McKinley, fl. all the year. Less common than the other forms in the Philippines. India to Malaya.

6. MALVAVISCUS Dillenius

Shrubs or small trees, more or less hispid or pilose. Leaves variously toothed or lobed. Flowers red, peduncled, axillary, bracteolate. Calyx 5-lobed. Corolla exserted, campanulate. Staminal-column long-exserted, antheriferous near the apex. Ovary 5-celled, cells 1-ovuled; style-branches 10. Fruit subglobose, somewhat fleshy, tardily separating into 5 indehiscent carpels. (From *Malva*, another genus of the family, and the Latin "offspring.")

Species about 6 in tropical America, a single one introduced and cultivated in the Philippines.

*1. M. PILOSUS (Sw.) DC. Gomamela de China (Sp.-Fil.).

A shrub 1.5 to 2 m high, all parts with scattered, stellate-hispid hairs. Leaves ovate, 6 to 10 cm long, irregularly toothed, acuminate, base broad, 5- to 7-nerved. Flowers in the upper axils, erect, red. Bracteoles about 7, linear-oblong, as long as the calyx. Calyx green, 5-lobed, 1 cm long. Corolla about 2.5 cm long, the lobes strongly imbricate. Staminal-column long-exserted, slender. Fruit surrounded by the persistent calyx and bracteoles, about 6 mm in diameter.

Occasionally cultivated for ornamental purposes, fl. Oct.–Mar., and probably in other months. A native of the West Indies.

7. KOSTELETZKYA Presl

Herbs, often suffrutescent, usually more or less hispid. Leaves orbicular to ovate, more or less toothed or lobed. Flowers axillary, solitary, peduncled, the bracteoles 7 to 10, linear. Calyx 5-lobed. Staminal-column entire or 5-lobed, slightly exserted. Ovary 5-celled, cells 1-ovuled; style branches 5. Capsule 5-angled, loculicidally dehiscent. (In honor of V. F. Kosteletzky, a Bohemian botanist.)

Species 6 or 7 of wide tropical and subtropical distribution, 1 in the Philippines.

1. **K. batacensis** (Blanco) F.-Vill. Calot-calotan (Tag.).

A spreading or somewhat erect branched herb, 1 m high or less, all parts more or less stellate-pubescent and with scattered stellate-hispid hairs. Leaves suborbicular, 2 to 5 cm long, shallowly 3-lobed, toothed, base cordate, 5- to 7-nerved. Flowers axillary, long-peduncled, solitary, about 1.5 cm long, the bracteoles linear, 7 to 10, as long as the pubescent and hispid calyx. Corolla pinkish-red. Fruit about 1 cm in diameter, depressed, prominently 5-angled or winged, loculicidally dehiscent.

In open waste places, Pasay, fl. Jan.–Feb. Known only from Luzon and apparently of very local occurrence; possibly an introduced plant.

8. ABELMOSCHUS Medikus

Coarse, erect, branched, usually annual herbs, more or less hairy, with subentire or variously lobed leaves and large, alternate, axillary flowers. Bracteoles 5 or more. Calyx spathe-like, split down one side and falling after flowering. Petals 5, connate at the base with the staminal-tube. Staminal-tube toothed at the apex and bearing many anthers. Ovary 5-celled, cells many-ovuled. Styles 5, connate below. Capsule loculicidally 5-valved. (From an Arabian name signifying "father of musk" in reference to the musky odor of the seeds of some species.)

Species 15 or more of wide tropical distribution, about 8 in the Philippines.

Peduncles about as long as the petioles; capsules 7 cm long or less; seeds with a musky odor........................ 1. *A. moschatus*

Peduncles very much shorter than the petioles; capsules 10 to 20 cm long; cultivated only........................ 2. *A. esculentus*

1. A. MOSCHATUS Medik. (*Hibiscus abelmoschus* L.). Castuli, Calupi (Tag.).

An annual, erect, branched, hispid-hairy herb 1 m high or less. Leaves orbicular-ovate to ovate in outline, 6 to 15 cm long, variously angled or lobed, the angles or lobes usually 3 or 5, rarely more, usually broad, base cordate, apex acuminate, margins toothed. Peduncles about as long as the petioles. Bracteoles linear, usually about 8, 1.5 cm long. Calyx 2 to 3 cm long, split down one side, toothed at the apex. Corolla yellow, purple at the base inside, about 10 cm in diameter. Capsule oblong-ovoid, 5 to 7 cm long, hispid-hairy. Seeds musky. (Fl. Filip. *pl. 245.*)

In waste places, occasional, fl. most of the year; widely distributed in the Philippines, and probably of prehistoric introduction here. India to Malaya, cultivated in many other tropical countries.

*2. A. ESCULENTUS (L.) Moench. (*Hibiscus esculentus* L.). Okra, Gumbo.

A coarse, erect, branched, annual herb 0.6 to 1.5 m high, more or less hairy. Leaves orbicular or orbicular ovate, 25 cm long or less, base cordate, margins 3- or 5-lobed, the lobes broadly ovate to oblong, coarsely toothed, the petioles equaling or longer than the leaves. Flowers axillary, solitary, their pedicels about 2 cm long. Bracteoles 8 or 10, linear, deciduous. Calyx hairy, about 3 cm long. Corolla large, yellow, deep-purple at the base inside. Capsule 10 to 20 cm long, narrowly oblong.

Cultivated for its edible fruits, fl. most of the year. The culture of this species is by no means general in the Philippines, and it seems to have been of comparatively recent introduction, at least after 1845. Probably a native of India, now cultivated in most tropical and subtropical countries.

9. HIBISCUS Linnaeus

Herbs, shrubs, or trees, glabrous or hairy, sometimes spiny. Leaves entire or more or less palmately lobed, stipulate. Bracteoles 5 or more, rarely wanting, free or connate at the base. Calyx 5-toothed or 5-lobed. Petals 5, connate at the base with the staminal-tube. Staminal-tube truncate or 5-toothed at the summit. Ovary 5-celled; styles 5, connate below. Capsule loculicidally 5-valved. (An ancient Greek and Latin name of the mallow.)

Species about 190, mostly tropical, 10 in the Philippines.

1. An annual herb, cultivated only .... 1. *H. sabdariffa*
1. Shrubs or trees.
    2. Leaves 5-angled or 5-lobed; a shrub with large pink flowers, most parts densely grayish-stellate-pubescent; cultivated only. 2. *H. mutabilis*
    2. Leaves not angled or lobed.
        3. A tree with yellow flowers, the leaves very prominently cordate at the base .... 3. *H. tiliaceus*
        3. Shrubs, cultivated only, the flowers red; leaves not cordate.
            4. Flowers very large, petals entire .... 4. *H. rosa-sinensis*
            4. Flowers medium, pendulous, the petals very deeply fimbriate-divided .... 5. *H. schizopetalus*

*1. **H. SABDARIFFA** L. Rozelle.

An erect, branched, glabrous or nearly glabrous, annual herb 1 to 2 m high, the stems purplish. Leaves 8 to 12 cm long, polymorphous, entire to deeply 3- or 5-lobed, the lobes oblong to oblong-lanceolate, often free nearly to the base of the leaf, toothed. Peduncles axillary, solitary, much shorter than the petioles. Bracteoles 8 to 12, linear, adnate to the base of the calyx, about 1 cm long. Calyx somewhat hirsute, the lobes acuminate, connate below the middle into a fleshy cup. Corolla pink with a dark center about 5 cm long. Fruit ovoid, pointed, villous, about 2.5 cm long, enclosed by the fleshy, acid, accrescent calyx.

Cultivated, Singalon, fl. Nov.–Jan. A native of India, now cultivated in many tropical and warm countries for its edible fruits; of very recent introduction in the Philippines.

*2. **H. MUTABILIS** L. Mapola (Tag.).

An erect, branched shrub 2 to 4 m high, more or less densely covered with short, grayish, stellate hairs. Leaves broadly ovate to orbicular-ovate, 5-lobed or 5-angled, crenate, 7 to 20 cm long, acuminate, base cordate. Pedicels axillary, solitary, 8 to 14 cm long. Bracteoles 10, linear, stellate-pubescent, 1.5 to 2.5 cm long, nearly or quite free. Calyx 3 to 4 cm long, densely stellate-pubescent, the lobes 5, oblong-ovate, acuminate, connate below. Corolla 10 to 12 cm in diameter, single or double, opening pale-pink, or nearly white, growing darker in color as the day advances. (Fl. Filip. *pl. 175.*)

Cultivated for ornamental purposes, fl. most of the year; a native of China, now cultivated in most tropical countries. Not spontaneous in the Philippines, but of early introduction.

3. **H. tiliaceus** L. Balibago (Tag.).

A much-branched tree 4 to 12 m high. Leaves 10 to 15 cm long, suborbicular, green, glabrous and shining on the upper surface, the lower surface grayish, pubescent, apex shortly acuminate, base prominently cordate, the sinus narrow, the basal lobes rounded, margins minutely crenulate. Peduncles terminal, few-flowered. Bracteoles connate into a persistent, 9- or 10- toothed, persistent cup. Sepals 5, oblong, acuminate, pubescent, 2 cm long, persistent. Petals yellow, dark-purple at the base inside, orbicular-obovate, rounded, about 5 cm long and wide. Capsule ovoid, pubescent, 1.5 cm long, surrounded by the persistent sepals, and at the base by the bracteolar cup, falsely 10-celled, 5-valved. (Fl. Filip. *pl. 274.*)

Common near the sea, fl. Aug.–Feb.; throughout the Philippines near the sea. Tropics generally.

*4. H. ROSA-SINENSIS L. Gomamela (Tag.).

An erect, much branched, glabrous shrub 1 to 4 m high. Leaves ovate, acuminate, coarsely toothed, 7 to 12 cm long. Flowers solitary, axillary, very large, about 10 cm long, 12 cm in diameter. Bracteoles 6, lanceolate, green, 8 mm long or less. Calyx green, 2 cm long, the lobes ovate. Petals red, obovate, rounded, imbricate. Staminal-tube slender, longer than the corolla.

Commonly cultivated, fl. all the year. Probably a native of south-eastern Asia, now cultivated in all tropical and subtropical countries.

Several cultural forms or varieties occur in Manila, chiefly one with double red flowers, and one with double yellowish flowers, the flowers of both somewhat smaller than in the typical form. (Fl. Filip. *pl. 270.*)

*5. H. SCHIZOPETALUS Hook. f. Gomamela (Tag.); Araña (Sp.-Fil.).

An erect, glabrous shrub 1 to 4 m high, the branches often elongated, drooping or subscandent. Leaves oblong-ovate or elliptic-ovate, acuminate, 5 to 7 cm long, dentate. Flowers axillary, solitary, about 8 cm in diameter, pendulous, the peduncles up to 15 cm in lenth. Bracteoles minute. Calyx green, 1.5 cm long, the lobes short, the tube often split down one side. Petals red, or red and yellowish-white, recurved, finely split into numerous slender lobes and laciniae. Staminal tube very slender, long-exserted, pendulous.

Common in cultivation, fl. all the year; in towns throughout the Philippines, but not spontaneous. Probably a native of tropical Africa, now cultivated in most tropical countries.

10. THESPESIA Correa

Shrubs or trees, pubescent or glabrous. Leaves entire or lobed. Flowers large, axillary, solitary, or on few-flowered peduncles, the bracteoles deciduous. Calyx truncate, 5-toothed or 5-parted. Corolla campanulate, the petals convolute, yellow, with a large purple spot at the base. Staminal-tube 5-toothed. Ovary 4- or 5-celled; style club-shaped, 5-furrowed or 5-toothed. Capsule loculicidal or scarcely dehiscent. Seeds glabrous or tomentose. (From the Greek "divine," on account of its showy flowers.)

Species few, Madagascar to tropical Asia, Malaya and Polynesia, 2 in the Philippines.

Shrub; leaves pubescent beneath, usually somewhat 3-lobed...... 1. *T. lampas*
Tree; leaves glabrous, entire, acuminate.................................. 2. *T. populnea*

1. **T. lampas** (Cav.) Dalz. & Gibs. Bulacbulacan (Tag.).

An erect slightly branched shrub 2 to 3 m high. Leaves ovate, 10 to 20 cm long, somewhat 3-lobed or nearly entire, green and nearly glabrous on the upper surface, somewhat stellate-pubescent beneath, base broad, cordate, apex acute or acuminate. Peduncles 3-flowered, axillary and terminal, forming a somewhat leafy panicle. Calyx green, of 5 subulate lobes connate below the middle. Corolla campanulate, 6 to 8 cm long, yellow, the center dark-purple. Capsule ovoid, about 3 cm long, 4-, somewhat 5-valved. (Fl. Filip. *pl. 355.*)

In dry open places, San Juan del Monte, near Fort McKinley, etc., fl. Oct.–Jan.; scattered in the Philippines, possibly introduced. India to Malaya and eastern Africa.

2. **T. populnea** (L.) Corr. Banago (Tag.).

A tree reaching a height of about 10 m, the branchlets, under surface of the leaves etc., covered with small brownish scales. Leaves glossy, broadly ovate, sharply acuminate, entire, base very broad, slightly cordate, 7-nerved, 8 to 15 cm long. Flowers axillary, solitary, long-peduncled. Calyx truncate, about 1.5 cm in diameter. Corolla yellow, dark-purple inside at the base, about 5 cm long, the lobes strongly imbricate, turning purplish in age. Capsule depressed-globose, 2 to 3 cm in diameter. (Fl. Filip. *pl. 247.*)

Occasional near the sea, fl. most of the year; along the strand throughout the Philippines. Tropical Asia and Africa through Malaya to Polynesia.

11. GOSSYPIUM Linnaeus

Annual or perennial herbs or shrubs, mostly erect, branched. Leaves mostly palmate, 3- to several-lobed. Flowers large, axillary, mostly yellow, often purple at the base inside. Bracteoles 3, large, leafy, cordate, lobed-laciniate. Calyx cup-shaped, truncate or 5-toothed. Corolla campanulate, the petals convolute or spreading. Ovary 5-celled. Capsule loculicidally 3- to 5-valved. Seeds densely clothed with a fuzz or with woolly hairs, or both. (Said to be derived from an Arabian word signifying "softness.")

Species about 42, tropics of both hemispheres, many cultivated, about 4 species in the Philippines, all manifestly introduced.

Leaves 3-lobed, up to 12 cm long; corolla about 4 cm long; seeds free, covered with a dense fuzz in addition to the wool............ 1. *G. hirsutum*

Leaves 3- to 5-lobed, up to 25 cm long; corolla 6 to 8 cm long; seeds conglomerate, glabrous, woolly but with no fuzz................ 2. *G. brasiliense*

*1. G. HIRSUTUM L. Bulac (Tag.); Algodon (Sp.); Cotton.

An erect, branched, suffrutescent herb 0.5 to 1.5 m high, the younger parts sparingly villous or stellate-villous. Leaves broadly ovate, 5 to 12 cm long the upper ones usually entire, the lower ones 3-lobed in the upper one-half, the lobes broadly ovate, triangular-acuminate, base cordate, the lower surface conspicuously black-punctate. Flowers yellow, in age turning pinkish. Bracteoles three, free, green, base deeply cordate, margins fimbriate-cleft. Calyx 5-toothed. Corolla about 4 cm long. Fruit ovoid, about 3.5 cm long, beaked, 3- or 4-celled. Seeds free from each other, densely covered with a fine fuzz in addition to the floss.

Singalon, cultivated, probably raised from American seeds, fl. May–June. Widely distributed in tropical and warm countries, but of very recent introduction in the Philippines.

*2. C. **BRASILIENSE** Macfad. Bulac-castila (Tag.); Algodon (Sp.); Cotton.

An erect branched shrub 1 to 3 m high, the stems purplish, glandular. Leaves 10 to 25 cm long, stellate-tomentose beneath when young, becoming glabrous or nearly so, 3- to 5-lobed, the lobes ovate to oblong, acuminate, base cordate. Flowers large, yellow. Bracteoles green, glabrous, ovate, cordate, deeply laciniate, 5 to 7 cm long. Corolla pale-yellow, campanulate, scarlet or purple at the base inside, exceeding the bracts in length. Capsule oblong-ovoid, 4 to 5 cm long, acuminate. Seeds conglomerate, with abundant wool but no fuzz.

Occasionally cultivated for ornamental purposes in Manila, fl. most of the year; widely distributed in the Philippines, cultivated and as an escape. A native of Brazil, now cultivated and wild in many tropical countries.

85. BOMBACACEAE (BOMBAX OR BOBOY FAMILY)

Trees with alternate, stipulate, digitately compound, deciduous leaves. Inflorescence axillary or terminal. Flowers regular, perfect, medium or large. Calyx cup-shaped, truncate or irregularly 3- to 5-lobed. Petals 5, imbricate. Stamens pentadelphous, opposite the petals, divided above into few or numerous filaments. Ovary 5-celled, superior, free; stigmas 5, or 1 and obscurely 5-lobed; ovules many in each cell. Fruit a loculicidally 5-valved capsule. Seeds with woolly or silky hairs.

Genera about 20, species more than 100, widely distributed in the tropics, 4 genera and 4 species known from the Philippines.

Ultimate filaments very many, each with a single reniform anther; flowers very large, red; very large trees........ 1. *Bombax*

Ultimate filaments few, each with 2 or 3 linear or sinuate anthers; flowers of medium size, white or yellowish; small trees........ 2. *Ceiba*

1. BOMBAX Linnaeus

Large trees with digitate, deciduous leaves. Peduncles axillary or subterminal, solitary or clustered, 1-flowered. Flowers large, red, appearing before the leaves. Calyx leathery, cup-shaped, truncate or irregularly lobed. Petals obovate. Stamens pentadelphous, the bundles opposite the petals, divided above into numerous filaments; anthers reniform, 1-celled. Ovary 5-celled; style clavate; stigmas 5; ovules many in each cell. Capsule loculicidally 5-valved, the valves leathery, woolly within. Seeds woolly. (From the Greek name for silkworm or silk.)

Species about 50, chiefly in tropical America, one in the Philippines.

1. **B. ceiba** L. (*B. malabarica* DC.). Buboy-gubat, Malabulac (Tag.).

A large tree, 25 m high or more, the trunk with few or many, very large, pyramidal spines. Leaves deciduous; leaflets 5 to 7, oblong to oblong-lanceolate, acuminate, 10 to 20 cm long, glabrous, the petioles longer than the leaflets. Flowers large, red, 8 to 10 cm long, appearing before the leaves, fascicled at or near the ends of the branches. Petals more or less stellate-pubescent on both surfaces. Capsule about 15 cm long, the valves silky within. Seeds numerous, obovate. (Fl. Filip. *pl. 226.*)

A single tree known to me in our area, and that in the old Botanical Garden, fl. Feb.–March; rather widely distributed in the Philippines at low altitudes. India to Malaya.

2. CEIBA Gaertner

Trees, with us of medium size. Leaves digitately compound, deciduous. Flowers appearing with or before the leaves, fascicled in the upper axils, white. Calyx cup-shaped, truncate, or obscurely 5-lobed. Petals oblong. Staminal bundles 5, connate at the base, each bearing 2 or 3 sinuous or linear anthers. Ovary ovoid, 5-celled; style cylindric, dilated; stigma obscurely 5-lobed. Capsule oblong, coriaceous or woody, 5-celled, 5-valved, valves silky within. Seeds globose, smooth, with silky hairs. (A native American name.)

Species 9, probably all originally of tropical America, one now distributed throughout the tropics.

1. C. PENTANDRA (L.) Gaertn. Boboy (Tag.); Silk Cotton Tree, Kapoc.

Usually a slender erect tree 15 m or less in height, the trunk cylindric usually with scattered large spines, the branches in distant worls, spreading horizontally. Leaflets 5 to 8, lanceolate, acuminate, entire, 6 to 15 cm long, the petioles as long as or longer than the leaflets. Flowers numerous, whitish, about 3 cm long. Petals densely silky outside. Capsules oblong, pendulous, about 15 cm long and 5 cm thick. (Fl. Filip. *pl. 238.*)

Scattered throughout our area, fl. Jan.–March; widely distributed in the Philippines, although not found truly wild; undoubtedly with us an introduced tree, and probably originating in tropical America. All tropical countries.

86. STERCULIACEAE (CACAO OR CALUMPING FAMILY)

Herbs, shrubs, or trees, usually pubescent. Leaves alternate, simple or digitately compound, often lobed, stipulate. Inflorescence axillary or terminal, cymose, panicled, or fascicled. Flowers regular, 1-sexual or perfect. Sepals 5, more or less connate. Petals 5 or none. Stamens numerous, united in a tube, rarely few and free; anthers variously disposed on the staminal-tube. Ovary free, 2- to 5-celled, rarely of 1 carpel, sessile or stalked; styles connate; ovules few or many, attached in the inner angles of the carpels. Fruit dry or fleshy, dehiscent or indehiscent.

Genera 51, species about 900, in the tropics of both hemispheres, 15 genera and about 40 species in the Philippines.

1. Petals none; trees.
  2. Anthers numerous; fruit follicular, dehiscent........................ 1. *Sterculia*
  2. Anthers 5; fruit indehiscent, boat-shaped, keeled................ 2. *Heritiera*
1. Petals present.
  2. Flowers in fascicles on the trunk and branches; fruit large, fleshy. 3. *Theobroma*
  2. Flowers panicled, cymose, or in axillary clusters.
    3. Stamens about 15, the filaments united below into a column, anthers alternating with staminodes.
      4. Capsule membranaceous, inflated.. 4. *Kleinhofia*
      4. Capsule more or less woody, not inflated.
        5. Seeds not winged; anther-cells divaricate; shrubs.... 5. *Helicteres*
        5. Seeds winged; anther-cells parallel; trees........ 6. *Pterospermum*
    3. Stamens 5, the filaments united only at the base; staminodes none.
      4. Ovary 5-celled.. 7. *Melochia*
      4. Ovary 1-celled.. 8. *Waltheria*

1. STERCULIA Linnaeus

Trees with simple, entire or lobed, or digitately compound leaves, the inflorescence axillary, panicled. Flowers polygamous. Calyx tubular or funnel-shaped, 4- or 5-parted, the lobes spreading or cohering by their tips. Petals none. Staminal-column bearing a head or ring of sessile anthers. Ovary sessile or stipitate, of 4 or 5, 2- to many-ovuled carpels; styles connate below; stigmas radiate. Fruit a small or large, inflated, few- to many-seeded, coriaceous or woody follicle. (Latin in reference to the offensive odor of the flowers of some species.)

Species about 100 in the tropics of both hemispheres, about 15 in the Philippines.

1. Leaves digitately compound.......... 1. *S. foetida*
1. Leaves simple.
    2. Leaves glabrous.
        3. Leaves cordate at the base; calyx-lobes spreading.......... 2. *S. luzonica*
        3. Leaves rounded at the base; calyx-lobes cohering by their tips. 3. *S. oblongata*
    2. Leaves prominently pubescent on the nerves beneath.......... 4. *S. cuneata*

1. **S. foetida** L. Calumpang (Tag., Pamp.); Bangar (Il.); Bobog (Vis.).

A spreading tree reaching a height of 20 m or more. Leaves crowded at the ends of the branches, digitately compound, the leaflets 7 to 9, glabrous, coriaceous, entire, elliptic-lanceolate, sharply acuminate, 12 to 18 cm long. Panicles axillary, appearing with the new leaves, erect. Flowers rank-smelling, dull-yellowish or purplish, 2 to 2.5 cm in diameter, the calyx-lobes oblong-lanceolate, acuminate, longer than the tube, villous within. Follicles large, woody, red, nearly glabrous, obovoid, about 10 cm long. Seeds 10 to 15. (Fl. Filip. *pl. 184.*)

Occasional in our area, fl. March–Apr.; throughout the Philippines. Eastern Africa to India through Malaya to northern Australia.

2. **S. luzonica** Warb.

A glabrous spreading tree 6 to 10 m high. Leaves elliptic-ovate to elliptic, simple, entire, 8 to 17 cm long, acute or obtuse, base cordate. Panicles in the upper axils, glabrous, peduncled, rather lax. Flowers 7 to 8 mm long, glabrous outside, pubescent within, the calyx-lobes oblong, spreading. Follicles thickly coriaceous, red, inflated, pubescent, shortly stalked, falcate, 5 to 6 cm long, beaked. Seeds few.

Rare in Singalon, fl. Dec.–Mar.; widely distributed in the Philippines along the seashore. Gilolo.

3. **S. oblongata** R. Br.

A tree, glabrous or nearly so, 12 m high or less. Leaves simple, entire, oblong, 12 to 20 cm long, shortly acuminate, base rounded. Panicles in the upper axils, narrow, slender, many-flowered, equaling or longer than the leaves. Flowers 5 to 6 mm long, somewhat hairy, the calyx-lobes linear, ciliate, cohering by their tips. Follicles oblong, inflated, thickly coriaceous, red, obtuse, densely pubescent, about 5 cm long and 3.5 cm wide, sessile. Seeds 4 to 6, about 1.5 cm long.

Uncommon in our area, fl. Sept.–Oct.; widely distributed in the Philippines. Endemic.

4. **S. cuneata** R. Br. Malabunot, Calucalumpangan (Tag.).

A deciduous tree 4 to 15 m high, more or less rusty-pubescent, the branchlets somewhat thickened. Leaves crowded at the ends of the branchlets oblong-obovate to broadly oblong-lanceolate, 10 to 35 cm long, rather abruptly short-acuminate, base rather broad, rounded-cordate, pubescent on the nerves, especially on the lower surface. Panicles in the upper axils, rather narrow, usually about as long as the leaves, reddish-brown or purplish, hirsute. Flowers greenish-brown or reddish, ovoid to obovoid, 10 to 12 mm long, hirsute, calyx-lobes cohering by their apices, longer than the tube. Follicles inflated, oblong to oblong-obovoid, 3 to 6 cm long, brown and densely rusty-pubescent outside, red or purple within. Seeds 7 or less, ellipsoid, 10 to 12 mm long.

In thickets, Masambong to Guadalupe and Pasay, fl. Nov., Feb.–Mar.; widely distributed in the Philippines. Endemic.

2. HERITIERA Aiton

Trees with simple, coriacious, entire leaves which are pale and densely scaly beneath. Flowers small, unisexual, in axillary panicles. Calyx 4- to 6-toothed. Petals none. Anthers in a ring at the top of the column. Ovaries 5 or 6, almost free, ovules solitary. Fruits indehiscent, woody, keeled or winged. (In honor of C. L. l'Heritier, a French botanist.)

A small genus of 7 or 8 species, tropical Africa and Asia through Malaya to Australia, 1 or 2 in the Philippines.

1. **H. littoralis** Dryand. Dungon-late (Tag.).

A tree 5 to 15 m high or more. Leaves oblong-ovate to elliptic-ovate, 10 to 20 cm long, apex obtuse or acute, base usually rounded, the upper surface glabrous and shining, the lower surface densely covered with small, round, pale or silvery-white scales. Panicles pubescent, 7 to 15 cm long, the flowers numerous, yellowish-green, bell-shaped, about 5 mm long, usually 5-toothed. Fruit hard and shining, smooth, 4 to 6 cm long, broadly boat-shaped, keeled. (Fl. Filip. *pl. 341.*)

Near the sea, Malabon, Malate, etc., rarely also cultivated, flowering at intervals throughout the year; along the seashore throughout the Philippines, yielding the valuable timber known as *dungon* or *dungon late*. Widely distributed along the tropical seashores of the Old World.

3. THEOBROMA Linnaeus

Trees with large, alternate, entire, oblong leaves. Flowers small, perfect, regular, solitary or fascicled on the trunk and branches, or axillary. Calyx 5-fid, the sepals nearly free. Petals 5, concave and hooded below, above inflexed and narrowed, produced into a flat or spathe-like limb. Staminal-tube with 5, linear, acuminate, erect lobes; stamens 1 to 3 in each sinus of the staminal tube. Ovary sessile, 5-celled, many-ovuled. Fruit ovoid, large.

Species about 20 in tropical America, 1 now cultivated in most tropical countries. (Greek "god" and "food," literally "food of the gods.")

*1. T. CACAO L. Cacao, Chocolate.

A tree 3 to 5 m high. Leaves 15 to 40 cm long, acuminate, base rounded oblong-obovate to oblong, base shortly 3-nerved. Flowers solitary or fascicled on the trunk and branches, yellowish or nearly white, pedicelled, about 1 cm in diameter, the erect lobes of the staminal column purplish.

Fruit oblong, 10 to 15 cm long, prominently wrinkled, yellow or purplish. Seeds numerous. (Fl. Filip. *pl. 275.*)

Occasionally cultivated in our area, fl. all the year; throughout the Philippines in cultivation. A native of tropical America, introduced here by the Spaniards at an early date, now cultivated in most tropical countries.

4. KLEINHOFIA Linnaeus

A tree with simple, broadly ovate, acuminate, entire, palmately nerved leaves. Panicles terminal, ample, lax, many-flowered. Flowers small, numerous. Sepals 5, deciduous. Petals 5, unequal, the upper with longer claws, margins involute. Staminal-column dilated above into a 5-fid cup, each lobe with 3 anthers. Ovary inserted in the staminal-cup, 5-lobed, 5-celled. Capsule membranaceous, inflated, obovate, loculicidally 5-valved. Seeds 1 or 2 in each cell. (In honor of M. Kleinhof, a Dutch botanist.)

A monotypic genus.

1. **K. hospita** L. Tanag (Tag., Vis.); Bitnong (Il.).

A tree 8 to 15 m high, somewhat pubescent or nearly glabrous. Leaves broadly ovate, acuminate, base 5- or 7- nerved, cordate or truncate, 10 to 20 cm long, long-petioled. Panicles ample, 20 to 40 cm long. Flowers pink, about 8 mm long, the sepals longer than the petals. Capsules about 2 cm long. (Fl. Filip. *pl. 328.*)

In thickets, Pasay, occasional, fl. Sept.–Nov.; common and widely distributed in the Philippines. Eastern Africa, tropical Asia, to Formosa, southward to Malaya.

5. HELICTERES Linnaeus

Shrubs, more or less stellate-pubescent, with simple leaves. Flowers axillary, solitary, fascicled, or in spike-like cymes. Calyx tubular, 5-fid, often irregular. Petals 5, clawed, equal or unequal, the claws often auricled. Staminal-column adnate to the gynophore, 5-toothed or lobed at the apex; anthers in groups between the teeth of the column, the cells divergent. Ovary at the top of the column, 5-lobed, 5-celled; styles slender, more or less united. Fruits follicular, oblong, usually shaggy-hairy. (Greek "twisted" or "spiral" in reference to the twisted carpels of some species.)

Species about 30 in the tropics of both hemispheres, 2 in the Philippines.

1. **H. hirsuta** Lour. (*H. spicata* Colebr.).

An erect, somewhat branched shrub 1 or 3 m high, all parts more or less pubescent. Leaves oblong to oblong-ovate, toothed, beneath stellate-pubescent, 10 to 20 cm long, the base obliquely cordate, apex long-acuminate. Cymes axillary, spike-like, 5 to 8 cm long. Flowers purple, nearly 2 cm long. Calyx stellate-pubescent, the lobes acuminate. Fruit oblong, 3 to 4 cm long, beaked, very shaggy. (Fl. Filip. *pl. 91.*)

In thickets, Masambong, Fort McKinley, etc., fl. Sept.–Nov., and probably in other months; widely distributed in the Philippines. India to China and Malaya.

6. PTEROSPERMUM Schreber

Trees, mostly scaly or stellate-tomentose. Leaves coriaceous, large, often oblique, simple or lobed. Peduncles 1 to 3, axillary and terminal, the bracteoles entire or laciniate. Flower large. Calyx of 5 or more connate sepals. Petals 5, falling with the calyx. Staminal-column short, with 5 ligulate staminodes opposite the petals, with 3 anthers between each two staminodes. Ovary within the tip of the staminal-column, 3- to 5-celled; styles entire. Capsule woody or coriaceous, often large, cylindric or angled, loculicidally 5-valved. Seeds numerous, winged at the apex. (Greek "wing" and "seed.")

Species about 20, tropical Asia and Malaya, 6 in the Philippines.

1. **P. diversifolium** Blume. Bayoc (Tag.).

A tree 4 to 10 m high. Leaves oblong to oblong-obovate, somewhat oblique, base truncate or cordate, apex very abruptly short-acuminate, 15 to 25 cm long, glabrous on the upper surface, the lower surface pale and densely stellate-pubescent, the leaves on young plants frequently deeply palmately lobed. Flowers axillary, sessile, solitary or in pairs, 12 to 14 cm long, the buds cylindric. Calyx-lobes narrow, coriaceous, recurved, densely brown-stellate-pubescent outside, inside pubescent and scaly. Petals thin, white, as long as the calyx-lobes. Capsule large, oblong, woody, about 15 cm long, 5-angled, narrowed at the base. (Fl. Filip. *pl. 182.*)

In thickets Masambong, San Juan del Monte, etc., fl. May–July; widely distributed in the Philippines. India to Malaya.

7. MELOCHIA Linnaeus

Herbs, undershrubs, or small trees, often pubescent. Leaves simple. Flowers small, in axillary heads or clusters, or panicled. Sepals connate below. Petals spathulate. Stamens 5, opposite the petals, connate below into a tube. Ovary sessile, 5-celled; styles 5, free or connate at the base. Capsule small, loculicidally 5-valved.

Species about 50, warmer parts of the world, 2 in the Philippines.

1. M. CORCHORIFOLIA L.

An erect or spreading, branched, suffrutescent herb usually less than 1 m high, with scattered stellate hairs or nearly glabrous. Leaves oblong-ovate, 2 to 6 cm long, acute or acuminate, base broad, rounded or cordate, 5-nerved. Flowers somewhat crowded in terminal or axillary heads, intermixed with linear bracteoles. Petals obovate, white, pink, or pale-purple, about 7 mm long. Capsule depressed-globose, 4 to 5 mm in diameter, slightly hirsute.

In open, usually damp grass lands, rather common, fl. all the year; throughout the Philippine, undoubtedly introduced. Most tropical countries.

8. WALTHERIA Linnaeus

Herbs or undershrubs, more or less pubescent. Leaves simple, toothed. Flowers yellow, in dense axillary clusters. Sepals 5, connate below. Petals 5, oblong-spatulate. Stamens 5, the filaments united into a tube. Ovary sessile, 1-celled, 2-ovuled. Capsule small, 2-valved, 1-seeded. (In honor of —— Walther.)

Species about 15, mostly in tropical America, one a widely distributed tropical weed.

1. W. AMERICANA L. (*W. indica* L.).

An erect, more or less branched, pubescent, shrubby or suffrutescent plant 0.5 to 1.5 m high. Leaves oblong-ovate or oblong, 3.5 to 9 cm long, rounded or obtuse, base rounded or subcordate, prominently nerved. Flowers about 5 mm long, in dense, axillary, sessile or shortly peduncled fascicles. Sepals and bracts green or pale, villous. Corolla somewhat exserted, yellow.

In open waste places, fl. most of the year, common and widely distributed in the Philippines, certainly introduced. Tropics generally, but probably of American origin.

87. DILLENIACEAE (DILLENIA OR CATMON FAMILY)

Shrubs or trees, sometimes climbing. Leaves alternate, simple, entire or toothed, the petioles often sheathing, exstipulate. Flowers small or large, regular, perfect. Sepals 5, persistent. Petals 5, rarely less, deciduous. Stamens many, hypogynous. Carpels 1 or more, free or cohering; styles distinct; ovules 1 to many. Fruit fleshy, indehiscent, or dry and follicular. Seeds solitary or many, arillate.

Genera 13, species about 325 in tropical and subtropical regions, 3 genera and about 30 species in the Philippines.

Scandent shrubs with small flowers.. 1. *Tetracera*
Trees with large flowers.. 2. *Dillenia*

1. TETRACERA Linnaeus

Climbing shrubs, the leaves scabrid or smooth, the veins parallel, prominent. Flowers white, perfect, many, in terminal or lateral panicles. Sepals 4 to 6. Petals 2 to 6. Filaments dilated upward. Ovary of from 1 to 5 carpels, ovules 2 to many in each. Fruit a small, ovoid, coriaceous follicle. Seeds 1 to 5, the aril toothed or fimbriate. (Greek "four" and "horn" from supposed resemblance of the fruit.)

Species about 25, 2 or 3 in the Philippines.

1. **T. sarmentosa** (L.) Vahl. Malacatmon (Tag.).

A climbing vine 3 to 5 m or more in length. Leaves oblong-obovate to oblong-elliptic, coriaceous, harsh, acute or obtuse, 6 to 12 cm long, the nerves very prominent, toothed. Panicles terminal and axillary, 10 to 25 cm long. Flowers numerous, white, about 8 mm in diameter. Carpel solitary. Follicle oblong-ovoid, pointed, nearly 1 cm long, 1-seeded, hirsute, the aril cupular, toothed. (Fl. Filip. *pl. 190, Delima sarmentosa.*).

In thickets, La Loma to Masambong, fl. May–June; widely distributed in the Philippines. India to Malaya.

2. DILLENIA Linnaeus

Trees with large, ovate to oblong, alternate, prominently pinnately nerved, toothed leaves, the petioles usually with broad, adherent, deciduous, wing-like stipules. Flowers large, solitary, or in few-flowered, terminal. spicate or racemose, simple or sparingly branched inflorescences. Sepals 5, spreading. Petals 5, thin, white or yellow, much larger than the sepals. Stamens very numerous, in several series, free or nearly so. Carpels 5 to 20, cohering in the axils or nearly free; ovules few to many. Fruit globose, fleshy, spirally ridged, enclosed in the thickened sepals, or of indehiscent or dehiscent follicle-like carpels. Seeds arillate or not. (In honor of J. J. Dillenius, an early English botanist.)

Species about 25, tropical Asia and Malaya, few in Madagascar, about 6 in the Philippines.

1. **D. philippinensis** Rolfe. Catmon (Tag., Vis., Bic.); Palali (Il.).

A tree 6 to 15 m high, glabrous or nearly so. Leaves coriaceous, shining, ovate, elliptic, or oblong-ovate, 12 to 25 cm long, carsely toothed. Flowers large, showy, about 15 cm in diameter, the petals white, stamens and styles purplish. Fruit globose, entirely enclosed by the sepals, 5 to 6 cm in diameter, the pulp soft, fleshy, acid, edible. (Fl. Filip. *pl. 199, D. speciosa.*)

A single tree, Nactajan, fl. most of the year; throughout the Philippines at low altitudes. Endemic.

88. GUTTIFERAE (GARCINIA OR PALOMARIA FAMILY)

Herbs, shrubs, or trees, often with yellowish juice. Leaves opposite, entire, thin or thick, often shining. Flowers solitary, cymose, racemed, or panicled, axillary or terminal, regular, perfect, polygamous, or dioecious. Sepals 2 to 6, imbricate. Petals as many as the sepals, rarely fewer or more. Stamens many, filaments free or monadelphous, or united in bundles. Ovary superior 1- to many-celled; styles one, or as many as the cells, free or united; ovules 1 to many. Fruit capsular, dehiscent, or baccate and indehiscent.

Genera 49, species about 850, in most parts of the world, 5 genera and about 50 species in the Philippines.

1. CALOPHYLLUM Linnaeus

Trees with opposite, coriaceous, shining leaves, with very numerous, close, parallel, spreading veins. Flowers polygamous, in axillary and terminal racemes or panicles. Sepals 4, imbricate. Petals 4, sometimes more. Stamens very numerous, the filaments free or connate below. Ovary 1-celled, 1-ovuled. Fruit a globose or ovoid drupe, the pericarp thin. (Greek "beautiful" and "leaf.")

Species about 60, chiefly in tropical Asia and Malaya, few in America, about 12 in the Philippines.

1. **C. inophyllum** L. Palomaria (Sp.-Fil.); Dancalan (Tag.).

A medium-sized or large tree, reaching a height of 20 m. Leaves coriaceous, shining, elliptic to obovate-elliptic, rounded, 9 to 18 cm long. Racemes axillary, 5 to 10 cm long, few-flowered. Flowers white, 2 to 2.5 cm in diameter, fragrant, the inner 2 sepals like the petals. Fruit globose, 3 to 4 cm in diameter. (Fl. Filip. *pl. 256.*)

Pasay beach, also occasionally cultivated, fl. all the year; throughout the Philippines along the seashore. India to Madagascar, Malaya, and Polynesia.

89. ELATINACEAE (BERGIA FAMILY)

Annual herbs or low undershrubs, erect or spreading, branched, glabrous or pubescent. Leaves opposite, serrate or entire. Flowers small, axillary, solitary or fascicled, pedicelled. Sepals 5, free, imbricate. Petals 5, free, imbricate. Stamens 5 to 10, hypogynous, free. Ovary superior, free, ovoid, 5-celled; styles 5, short, or stigmas sessile; ovules numerous, on the inner angles of the cells. Fruit a small, 5-celled, 5-valved, septicidal capsule.

Genera 2, species about 20, warmer parts of the world, a single genus and species in the Philippines.

BERGIA Linnaeus

Characters of the Family as given above. (In honor of P. J. Bergius, a Danish botanist.)

Species about 14, 1 in the Philippines.

1. **B. serrata** Blanco (*B. glandulosa* Turcz.).

An erect or ascending, branched, annual herb 10 to 30 cm high, often decumbent below. Stems and branches reddish, glandular-pubescent. Leaves oblong-elliptic to oblong-lanceolate, 1 to 2 cm long, acute, base narrowed, shortly petioled, the pedicels and sepals glandular-pubescent. Sepals green, lanceolate, acuminate, about 3 mm long. Petals pink, as long as the sepals. Stamens slender, 10, sometimes less. Capsule ovoid, 2 to 2.5 mm long.

In dried out rice paddies, occasional, fl. Jan.–Mar.; widely distributed in Luzon. Formosa.

90. BIXACEAE (BIXA OR ACHUETE FAMILY)

Trees with simple alternate leaves and minute stipules. Flowers in terminal panicles, perfect, regular. Sepals 5, imbricate, deciduous. Petals 5, free, contorted in bud. Stamens indefinite; anthers opening by terminal pores. Ovary superior, 1-celled; style slender, curved; stigma notched; ovules many, on 2 parietal placentas. Fruit a softly prickly loculicidal capsule, 2-valved. Seeds many.

A single genus and species, native of tropical America.

BIXA Linnaeus

Characters of the Family as given above.

1. **B. ORELLANA** Linn. Achuete (Sp.-Fil.); Anatto.

A tree 4 to 6 m high. Leaves ovate, entire, 8 to 20 cm long, 5 to 12 cm wide, base broad, more or less cordate, apex acuminate. Flowers white to pinkish, 4 to 6 cm in diameter. Capsules ovoid or subglobose, green or reddish-purple, about 4 cm long, covered with long, slender, rather soft spines, and containing many small, dark-red seeds. (Fl. Filip. *pl. 231.*)

Common in gardens, fl. Aug.–Dec.; cultivated throughout the Philippines. A native of tropical America, but now widely distributed in the tropics of the world. The seeds yield the anatto dye of commerce.

91. VIOLACEAE (VIOLET FAMILY)

Herbs or shrubs with alternate, mostly entire, stipulate leaves. Flowers regular or irregular, bracteolate. Sepals 5, equal or unequal. Petals 5, one frequently spurred at the base, hypogynous. Stamens 5, hypogynous, the filaments broad, the anthers introrse, free or connate, the connective produced above the anther-cells. Ovary superior, 1-celled, placentas parietal, many-ovuled. Capsule 3-valved or berry-like.

Genera 15, species about 350, of wide temperate and tropical distribution, 2 genera and about 10 species in the Philippines.

1. VIOLA Linnaeus

Herbs with alternate leaves, frequently stoloniferous. Flowers axillary, solitary, pedicelled, irregular. Sepals 5 persistent, produced at the base. Petals 5, the lower one largest, spurred at the base. Stamens 5, hypogynous, the anthers introrse, surrounding the pistil, the short broad filaments continued beyond the anther-cells, the lower 2 often spurred at the base. Ovary superior, 1-celled; style club-shaped or ending in a hook, the stigma simple, often turned to one side. Capsule 3-valved. Seeds many. (The ancient Latin name.)

Species about 150, widely distributed in temperate regions, few in the tropics, 5 or 6 in the Philippines, at medium and high altitudes, a single introduced one in our area.

* 1. V. ODORATA L. Violeta (Sp.); Violet.

Rootstock stout, the stems short or none, stolons slender. Leaves at the ends of the stems, orbicular to subreniform, base very deeply cordate, apex rounded, crenate-serrate, slightly hairy, 5 to 8 cm long, long-petioled. Flowers fragrant, 1.5 to 1.8 cm long. Sepals green, about 1 cm long, acute or obtuse. Petals violet, throat marked with white or with white lines. Style ending in a small hook.

Frequently cultivated, fl. Nov.–Jan. A native of Europe, introduced and cultivated only, not spontaneous.

92. FLACOURTIACEAE (FLACOURTIA OR BITONGOL FAMILY)

Trees or shrubs with alternate, entire or finely toothed leaves, the stipules small, deciduous. Flowers small, regular, perfect or 1-sexual, mostly axillary, fascicled or racemose. Calyx of 4 or 5 free or slightly united sepals. Petals small, as many as the sepals, or none. Stamens definite or indefinite, often with alternating staminodes, the filaments free or slightly united. Ovary superior or nearly so, 1- to several-celled; ovules 1 to many in each cell; style and stigmas free or united. Fruit usually fleshy, loculicidally 2- to 5-valved or indehiscent and drupaceous or berry-like. Seeds arillated or not.

Genera 79, species about 550, in most tropical countries, 10 genera and about 30 species in the Philippines.

Stamens many; ovary several-celled; fruit drupaceous, indehiscent. 1. *Flacourtia*

Stamens about twice as many as the calyx-lobes; ovary 1-celled; fruit dehiscent, the seeds arillate.. 2. *Casearia*

1. FLACOURTIA Commerson

Erect shrubs or trees, often spiny. Leaves toothed or crenate. Flowers small, dioecious, rarely perfect. Sepals 4 or 5, small. Petals none. Stamens many. Ovary 2- to 8-celled; ovules usually in pairs; styles 2 or more. Fruit fleshy, the endocarp hard, 2 to 8-celled, each cell 1-seeded. (Named after E. de Flacourt, a French traveller.)

Species about 12 in the tropics of the Old World, some cultivated, 2 or 3 in the Philippines.

1. **F. sepiaria** Roxb. Bitongol (Tag.).

An erect, branched, more or less spiny shrub or small tree 1 to 3 high, the spines rather slender, scattered, often 2 cm long. Leaves obovate to oblong-obovate, crenate, 2.5 to 5 cm long, crenate, apex rounded or retuse. Flowers white, axillary or terminating short branchlets, solitary or in pairs, long-pedicelled, about 5 mm in diameter, the sepals very much shorter than the stamens. Fruit globose and fleshy when fresh, purple or nearly black, smooth, about 1 cm in diameter, the pulp fleshy, edible, the endocarp usually 6-celled, deeply 6-lobed, the fruit conforming to the endocarp when dry.

In dry open places, Masambong to San Pedro Macati, fl. May–June; widely distributed in the Philippines. India to Malaya.

2. CASEARIA Jacquin

Erect unarmed shrubs or small trees, with alternate, distichous, entire or toothed leaves. Flowers small, perfect, in axillary clusters, the pedicels short, jointed. Calyx deeply 4- or 5-lobed. Petals none. Stamens about twice as many as the calyx-lobes, the filaments somewhat united in a tube below, alternating with staminodes. Ovary superior, free, 1-celled; ovules many. Fruit fleshy, ovoid to ellipsoid, ultimately dehiscent. Seeds angular or obovoid, usually with a fleshy aril. (In honor of J. Casearius, a Dutch botanist.)

Species 120 in the tropics of both hemispheres, about 7 in the Philippines.

1. **C. fuliginosa** Blanco.

A shrub or small tree 2 to 5 m high, nearly glabrous, the branchlets often slightly zigzag. Leaves oblong-ovate, 7 to 18 cm long, entire or nearly so, often slightly falcate, slightly acuminate, base broad usually rounded, often somewhat inequilateral. Flowers small, white, in few to many-flowered axillary clusters, 4 to 5 mm diameter, pale-green. Sepals 5, pubescent externally. Filaments hairy. Fruit ovoid or ellipsoid, 10 to 12 mm long, red or yellow when mature. Seeds arillate. (Fl. Filip. *pl. 90.*)

In thickets, La Loma to Masambong, fl. Feb.–Apr.; widely distributed in the Philippines. Endemic.

93. PASSIFLORACEAE (PASSION FLOWER FAMILY)

Usually perennial herbaceous or somewhat woody vines, climbing by means of tendrils. Leaves alternate, simple, entire or lobed, stipules usually present. Flowers axillary, solitary, or in cymes, small to large, usually with 3 minute to large bracteoles, regular, perfect or unisexual. Calyx tubular at the base, fleshy to thin, 5-lobed. Petals as many as the calyx-segments, or none. Corona of one to several rows of slender filaments, arising from the calyx-tube, rarely none. Stamens 5, the filaments united and adherent to the stalk of the ovary. Ovary usually stalked, 1-celled, many-ovuled, with parietal placentae; styles usually 3. Fruit berry-like, fleshy, indehiscent, often large, or capsular and 3-valved.

Genera 11, species about 400, chiefly tropical, most numerous in tropical America, 2 genera and about 7 species in the Philippines.

Flowers large and showy, perfect; fruit a large, fleshy berry.... 1. *Passiflora*
Flowers small, unisexual; fruit a capsule.. 2. *Adenia*

1. PASSIFLORA Linnaeus

Climbing, usually herbaceous, perennial vines, tendril-bearing. Leaves simple, entire or lobed, usually glandular beneath, at the base, or on the petiole. Flowers axillary perfect, solitary or cymose, showy. Bracteoles 3, small or large. Calyx 5-lobed. Petals 5, about as long as the calyx-lobes. Corona of 1 to several rows of numerous, usually filiform segments springing from the calyx-tube. Gynophore surrounded at the base by a shallow membranaceous cup or basal corona. Anthers 5, dorsifixed. Ovary 1-celled; styles 3. Fruit fleshy, berry-like, indehiscent, the seeds arillate. (Adapted from the Latin *flos passionis.*)

Species 300, chiefly in tropical America, 1 indigenous, and the following three introduced ones in the Philippines.

1. Stems prominently 4-angled and narrowly 4-winged.. 1. *P. quadrangularis*
1. Stems terete.
   2. Plants nearly glabrous; leaves deeply palmately 3-lobed, the involucral bracts nearly entire.......... 2. *P. edulis*
   2. Plants hirsute and ciliate; leaves very shallowly lobed or only sinuate, the involucral bracts 1- to 3-pinnately divided into fine segments. 3. *P. foetida*

*1. P. QUADRANGULARIS L. Granadilla.

A stout, glabrous, herbaceous vine reaching a height of 10 to 15 m, the stems prominently 4-angled and narrowly winged. Leaves ovate to elliptic, entire, very shortly acuminate, base broadly rounded, 10 to 15 cm long, the petioles with scattered glands, the stipules foliaceous, 1.5 to 2 cm long. Flowers large, solitary, fragrant. Petals reddish. Corona-filaments violet. Fruit large, ellipsoid, fleshy, edible, 15 to 20 cm long.

Occasionally cultivated, fl. Aug., and probaly in other months, not spontaneous. A native of tropical America, now cultivated in many other tropical countries.

*2. P. EDULIS Sims. Pasion (Sp.); Passion Flower.

A herbaceous, nearly glabrous vine, reaching a length of several meters, the stems terete. Leaves ovate in outline, 8 to 13 cm long, deeply palmately 3-lobed, the lobes oblong, acuminate, margins serrate, the petioles 2-glandular at the apex. Flowers fragrant, about 4.5 cm in diameter, solitary, the pedicels about 3 cm long. Bracts 3, green, elliptic to obovate, irregularly toothed, glandular on the margins. Sepals oblong, green, about 2 cm long, spurred at the apex. Petals lanceolate, pale-purplish, about as long as the sepals. Corona-filaments very numerous, in 3 series, white at the base, blue-purple above, often with white markings.

About houses, San Pedro Macati, fl. June–July. A native of Brazil, occasional in and about towns in the Philippines, but not spontaneous.

3. PASSIFLORA FOETIDA L.

A herbaceous vine with slender terete stems, prominently villous with spreading hairs. Leaves ovate to oblong-ovate, 6 to 9 cm long, thin, shallowly 3-lobed or often only sinuate, ciliate, acute or acuminate, base cordate. Flowers solitary, white or pinkish, about 3 cm in diameter, subtended by a prominent involucre of 3 bracts which are 1- to 3-pinnately divided into numerous segments, the ultimate segments glandular. Sepals about 1.5 cm long, pale. Petals about as long as the sepals, white or pinkish. Corona of 3-seriate, slender segments. Fruit ovoid, dry, inflated, 3 to 5 cm long.

In thickets, Pasay, occasional. A native of tropical America, introduced here and occasionally found in and about towns, spontaneous or subspontaneous; also now found in various other tropical countries.

2. ADENIA Forskal

Twining, usually glabrous, tendril-bearing, herbaceous or suffrutescent vines. Leaves entire or palmately lobed, usually with 1 or more flat circular glands on the under surface and with similar ones at the apex of the petiole. Flowers small, unisexual, in axillary, peduncled, few-flowered cymes. Male flowers: Calyx tubular or campanulate, 5-lobed. Petals 5, free, thin, 1-nerved. Corona a ring of threads springing from the calyx-tube, or wanting. Disk-glands 5, strap-shaped or capitate. Androecium cup-shaped, membranaceous beneath; filaments 5. Ovary rudimentary or none. Female flower with calyx and corolla as in the male. Corona a membranaceous fold, or none. Staminodes 5, forming a membranaceous cup surrounding the base of the ovary, dividing above into barren filaments. Ovary stalked or sessile. Fruit capsular, 3-valved. (Greek "gland" from the glandular leaves and petioles.)

Species about 60 in the tropics of the Old World, 2 or 3 in the Philippines.

1. **A. coccinea** (Blanco) Merr.

A glabrous, suffrutescent or woody vine reaching a height of 10 m or sometimes more. Leaves ovate to oblong-ovate, entire or sometimes palmately 3-lobed, acuminate, base cordate, 7 to 15 cm long. Cymes long-peduncled, few-flowered, usually tendril bearing. Flowers small. Fruit ovoid, scarlet, smooth, 6 to 7 cm long, many-seeded.

In thickets, Pasay, occasional, fl. Dec.–Jan.; widely distributed in the Philippines. Endemic.

94. CARICACEAE (PAPAYA FAMILY)

Erect, normally unbranched, dioecious trees with milky sap. Leaves alternate, crowded at the end of the stem, long-petioled, large, palmately 7- or 9-lobed. Male flowers in axillary, narrow, pendulous, elongated panicles. Calyx short, 5-toothed. Corolla salver-shaped, the tube slender, cylindric, the lobes 5, valvate or convolute. Stamens 10, inserted in the throat of the corolla; filaments short; anthers basifixed, exserted. Female flowers rather large, axillary. Calyx with 5 short lobes. Petals 5, free. Ovary superior, free, 1-celled; stigmas 5, lobed; ovules numerous, in 2 or many series on parietal placentae. Fruit large, fleshy. Seed globose, enclosed in a gelatinous covering, the testa variously roughened.

A single genus of few species, natives of tropical America.

CARICA Linnaeus

Characters of the Family. (Latin "fig," probably from its supposed leaf-resemblance.)

1. C. PAPAYA L. Papaya (Sp.-Fil.).

A small, erect, tree, 3 to 6 m high, unbranched, or sometimes when injured becoming branched, the trunk soft, grayish, marked with large petiole-scars. Leaves suborbicular in outline, 1 m broad or less, palmately 7- or 9-lobed, each lobe pinnately incised or lobed; petioles stout, hollow, about 1 m long. Staminate inflorescence axillary, pendulous, paniculate, 1 to 1.5 m long, the flowers in crowded clusters, straw-colored, fragrant, the corolla-tube slender, about 2 cm long. Pistillate flowers in short axillary spikes or racemes, the petals 7 cm long or less. Fruit subglobose, obovoid, or oblong-cylindric, 5 to 30 cm long, green or yellow when mature, fleshy.

Common in cultivation throughout the Philippines frequently spontaneous, fl. all the year; introduced from Mexico by the Spaniards at an early date, now found in all tropical countries.

A form occasionally occurs in Manila with a few female or perfect flowers developed on the male inflorescence which become fertilized and develop small fruits.

95. BEGONACEAE[1] (Begonia or Liñgat Family)

Succulent, creeping, climbing, or erect herbs or undershrubs, the stem often reduced to a root-stock. Leaves alternate, entire, toothed, or lobed, usually very unequal-sided. Inflorescence axillary, cymose, usually dichotomous, rarely fascicled. Flowers white or pink, monoecious, small or large. Male flowers: Perianth of 2 outer, opposite segments, and 2 inner smaller ones or these wanting; stamens usually many, the filaments free or more or less united; anthers narrowly obovate. Female flowers: Perianth of 2 to 5 segments. Ovary inferior, 2- to 4-celled; styles 2 to 4, free or united below, the stigmas branched or twisted; ovules very numerous. Fruit a usually winged, angular, thin-walled, capsule, variously dehiscent or irregularly breaking up. Seeds very small, numerous.

Genera about 5, species about 500 in most moist tropical countries, 1 genus in the Philippines.

1. BEGONIA Linnaeus

Characters of the Family. (In honor of M. Begón, a French promoter of science.)

Species nearly 500, in most tropical countries, about 60 in the Philippines.

1. **B. nigritarum** Steud. (*B. rhombicarpa* A. DC.). Liñgat, Piñgol-bato (Tag.).

Root-stock creeping, with numerous brown stipules and scattered brown hairs. Leaves obliquely ovate, acute or acuminate, irregularly angularly or undulately lobed or coarsely toothed, long-petioled, base cordate, fleshy when fresh and with a distinct acid taste, thin when dry, often purplish beneath, green or somewhat mottled above, slightly hairy, at least on the margins, 2.5 to 10 cm long. Scapes erect, equaling or longer than the leaves, dichotomous, few-flowered. Flowers pink or nearly white, 12 to 14 mm in diameter, male and female flowers with 4 perianth-segments. Capsule subequally broadly rhombic-ovoid, including the wings, triangular, 5 to 8 mm long, 3-winged, the wings subacute. (Fl. Filip. *pl. 418.*)

Occasionally cultivated, Singalon, fl. all the year; widely distributed in the Philippines on damp cliffs, in ravines, etc. Endemic.

In addition to the above a number of extra-Philippine garden forms and hybrids are cultivated in Manila, which have not been considered here.

96. CACTACEAE (Cactus Family)

Fleshy, erect or climbing plants, with much-thickened, usually green stems, usually leafless, supplied with few to many sharp spines which arise from small areolae. Stems various, in our genera cylindric, flattened, or triangular, jointed or continuous. Flowers usually large and showy, perfect, solitary. Calyx of few to many imbricate sepals. Petals numerous, in 2 to many series. Stamens numerous, the filaments slender, sometimes cohering with the base of the petals. Ovary inferior, 1-celled; ovules numerous, parietal; styles simple. Fruit a fleshy, often spiny berry. Seeds numerous.

Genera 20 or more, species over 1200, chiefly in the dryer parts of warm and tropical America, a few introduced in the Philippines.

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[1] For the Philippine representatives of this family, see Merrill, E. D., "The Philippine Species of Begonia." *Philip. Journ. Sci.* 6 (1911) *Bot.* 369–406.

Joints long, cylindric or 3- to 5-angled or -winged; flowers very large. 1. *Cereus*
Joints oblong-obovate, compressed; flowers small........................... 2. *Nopalea*

1. CEREUS Miller

Succulent, climbing or erect plants with distantly jointed, 3-angled stems, bearing short sharp spines in scattered marginal areolae. Leaves none. Flowers large, solitary. Calyx-tube long-produced above the ovary, the lobes very numerous, many-seriate, the outer ones much-reduced. Petals many, 2- to many-seriate, longer than the sepals. Stamens very numerous, many-seriate, the filaments adnate to the base of the calyx-tube. Style cylindric, elongated; stigma radiate. (Latin "a wax torch," from fancied resemblance of the flowers of some species.)

Species about 120 in the warmer and tropical parts of America, 3 introduced in the Philippines.

Climbing; stems and branches 3-angled.............................. 1. *C. triangularis*
Erect; stems and branches 5-winged.. 2. *C. lepidotus*

*1. C. **TRIANGULARIS** (L.) Mill. Caliz (Sp.-Fil.).

A climbing, branched plant, rooting at the joints, reaching a height of 8 m or more, the stems triangular, 3-winged, the joints 0.2 to 1 m long, or more, 4 to 6 cm thick, green, the wings thick, with remote areolae, each areola with 3 to 5, sharp, straight, 2 to 4 mm long spines. Flowers about 30 cm long. Sepals greenish-yellow, thick, lanceolate. Petals about 16, 2-seriate, 10 to 12 mm long, 4 to 5 cm wide, white, thin. Fruit said to be about 10 cm long, scarlet, smooth. (Fl. Filip. *pl. 324.*)

Occasionally cultivated, fl. June–Sept. Widely distributed in tropical America, an introdiced plant here.

*2. C. **LEPIDOTUS** Salm-Dyck.

Stout, erect, sparingly branched, up to 3.5 m high, the branches ascending, 10 to 12 cm in diameter, 5-winged, the margins of the wings with areolae 1 to 1.5 cm apart, each areola with 5 to 8 slender, sharp, radiating, brown spines 5 to 20 mm long. Flowers solitary, about 20 cm long, the tube about 1.5 cm in diameter, broadened above, narrowly funnel-shaped, 6 to 7 cm in diameter above. Sepals in several series, green, the lower ones oblong, short, gradually longer upward, the upper ones lanceolate to oblong-lanceolate, 6 to 7 cm long, 1.5 cm wide, apiculate. Petals white, much thinner than the sepals, oblong-lanceolate, 7 to 8 cm long, 1.5 to 2 cm wide. Stamens very numerous. Style green, cylindric, the radiating arms of the stigma about 1.7 cm long.

Rarely cultivated, occasional also in thickets, San Juan del Monte, Masambong, etc., fl. Sept.; occasional in the Provinces, in thickets and cultivated. A native of South America.

2. NOPALEA Salm-Dyck

Erect, branched, fleshy shrubs, the branches jointed, the joints compressed, oblong to obovate, green, with scattered cushion-like bodies which usually bear short spines. Flowers scattered, soli~~tary on the m~~argins of the upper joints, sessile, red. Calyx-tube not produced above the ovary, the lobes 6 to 8, scale-like. Petals 12 to 18, 2-seriate, ascending. Stamens very numerous, 2-seriate, longer than the petals. Ovary exserted; style elongated; stigma 5- to 7-lobed. Fruit fleshy, pyriform, many-seeded. (From the Mexican name *nopalnochotzli.*)

Species about 3, in tropical America, 1 now introduced in most other tropical countries.

1. N. COCHINELIFERA (Mill.) Salm-Dyck. Dilang-baca (Tag.); Cochineal Plant.

A fleshy, erect, branched, leafless plant 1 to 3 m high, the stems stout. Joints thick, oblong-obovate, green, fleshy, compressed, 15 to 25 cm long, with few, small, scattered, white, cushion-like bodies which are unarmed or bear small spines. Flowers scattered, solitary on the upper margins of the uppermost joints. Calyx green, oblong-ovoid, 3 to 3.5 cm long, fleshy, bearing areolae, these usually with small bristles. Corolla about 2.5 cm long. Petals several-seriate, red, the inner series gradually longer, but shorter than the exserted, red stamens. Fruit ovoid, purplish, fleshy, about 3.5 cm long, top much depressed.

Occasionally cultivated, fl. Nov.–May. A native of tropical America, introduced here, cultivated and in some localities subspontaneous.

97. LYTHRACEAE (HENNA OR BANABA FAMILY)

Herbs, shrubs, or trees, the branches often 4-angled. Leaves entire, opposite, alternate, or whorled. Inflorescence axillary or terminal, the flowers solitary, fascicled, spicate, cymose, or panicled. Flowers perfect, regular. Calyx-tube free, persistent, 3- to 6-lobed, lobes often appendiculate. Petals as many as the calyx-lobes, rarely none. Stamens few or many, inserted on the calyx-tube. Ovary free in the bottom of the calyx-tube, 2- to 6-celled; ovules many. Fruit coriaceous or membranaceous, dehiscent or indehiscent. Seeds usually many, various.

Genera 22, species 450, widely distributed in the tropics, especially in America, few in temperate or cold countries, 5 genera and about 14 species in the Philippines.

1. Trees or shrubs.
   2. Flowers small, 4-merous.. 1. *Lawsonia*
   2. Flowers large, 6-merous.. 2. *Lagerstroemia*
1. Low herbs with minute flowers.
      3. Walls of the capsules densely horizontally striate under a lens. 3. *Rotala*
      3. Walls of the capsules not striate.. 4. *Ammania*

1. LAWSONIA Linnaeus

An erect shrub or small tree, the older branches sometimes spinous. Leaves opposite, entire. Inflorescence a terminal panicle, the bracts small, deciduous. Flowers rather small, 4-merous, numerous. Calyx-tube very short, the lobes 4, ovate. Petals 4, obovate, inserted at the top of the calyx-tube. Stamens usually 8, inserted in pairs between the petals, sometimes fewer or more and not paired. Ovary free, sessile, 2- to 4-celled; style very long. Capsule coriaceous, globose, irregularly breaking up. Seeds many, angular, smooth. (In honor of Dr. J. Lawson, a Scotch friend of Linnaeus.)

A monotypic genus.

1. L. INERMIS L. Cinamomo (Sp.-Fil.); Henna.

An erect, much-branched shrub 3 to 6 m high. Leaves oblong-elliptic, apex acute and apiculate; base narrowed, 1.5 to 4 cm long. Panicles 7 to 30 cm long, the lower branches subtended by leaves. Flowers fragrant. Calyx about 4 mm long. Petals usually straw-yellow, a little longer than the calyx-lobes. Capsule depressed-globose, 5 to 7 mm in diameter. (Fl. Filip. *pl. 108.*)

Commonly cultivated for its fragrant flowers, occasionally spontaneous; in and about towns generally in the Philippines, chiefly cultivated, and certainly introduced after the Spanish occupation. A native of parts of Africa and India, now cultivated or spontaneous in most tropical countries.

2. LAGERSTROEMIA Linnaeus

Trees or shrubs with opposite, usually distichous, entire, oblong to ovate leaves. Panicles axillary and terminal, ample. Flowers large, showy, regular. Calyx-tube funnel-shaped, smooth, grooved, angular, or narrowly winged, lobes usually 6. Petals usually 6, large, clawed, margins crisped or undulate. Stamens long, very numerous, inserted near the base of the calyx-tube. Ovary sessile at the base of the calyx-tube, 3- to 6-celled, ovules many. Capsule ovoid to ellipsoid, more or less adnate to the persistent calyx-tube, 3- to 6-valved, 3- to 6-celled. Seeds many, winged at the apex. (In honor of M. Lagerstroem, a correspondent of Linnaeus.)

Species about 30, chiefly Indian and Malayan, few in China and Australia, 4 in the Philippines, of which 1 is introduced.

Leaves 4 to 8 cm long, subsessile; flowers about 4 cm in diameter; petals beautifully crisped and lobed, with a long slender claw........ 1. *L. indica*
Leaves 12 to 25 cm long, distinctly petioled; flowers 7 to 8 cm or more in diameter, the petals with a short claw............................ 2. *L. speciosa*

*1. L. INDICA L. Melindres (Sp.-Fil.); Crepe Myrtle.

A shrub or small tree, 4 m high or less, the branches slender, 4-angled, narrowly winged. Leaves entire, elliptic-ovate to oblong-ovate, or obovate, sessile, very shortly acuminate or obtuse, 4 to 8 cm long. Flowers about 4 cm in diameter, in small, terminal panicles. Calyx green, 6-lobed. Petals 6, pink or purplish, with a long slender claw, the limb 1.5 to 2 cm wide, orbicular or reniform in outline, lobed, strongly crisped. Capsule globose-ovoid, 1 cm long or less. (Fl. Filip. *pl. 207.*)

Occasionally cultivated for ornamental purposes, but not spontaneous, fl. June-Sept.; occasional in larger towns throughout the Archipelago. A native of China, now widely distributed in tropical and warm countries, cultivated and wild.

2. **L. speciosa** (L.) Pers. Banaba (Tag.).

A tree 4 to 20 m high, or sometimes flowering when a mere shrub 2 m high or less. Leaves coriaceous, oblong to elliptic-ovate, obtuse or shortly acuminate, 12 to 25 cm long. Panicles terminal, large, up to 40 cm in length. Flowers 6-merous. Calyx pubescent, ribbed. Petals lilac-purple, oblong-obovate or obovate, shortly clawed, 3 to 3.5 cm long. Capsule obovoid or ellipsoid, 2 to 3.5 cm long. (Fl. Filip. *pl. 314, L. reginae.*)

In thickets, Malabon, San Juan del Monte, etc., occasional, sometimes also cultivated for its very ornamental flowers, fl. May–Aug.; common and widely distributed in the Philippines. India, through Malaya to Australia.

3. ROTALA Linnaeus

Erect, low, simple or branched, annual herbs growing in wet places, glabrous or nearly so. Leaves decussate or verticillate, rarely alternate, sessile or subsessile. Flowers 3- to 6-merous, small, mostly sessile, axillary and solitary, or in axillary spikes or racemes, usually 2-bracteolate. Calyx campanulate to hemispheric, 3- to 6-lobed, the lobes usually with a setiform appendage. Petals small. Stamens 1 to 6. Ovary sessile or subsessile; style short or elongated. Capsules septicidally 2- to 4-valved, cartilaginous, the walls densely and minutely horizontally striate under a lens. (Probably from Latin "wheel" in reference to the verticillate leaves of most species.)

Species 38, chiefly in tropical Asia and Africa, a few in Australia, Europe, and America, 4 in the Philippines.

1. Leaves verticillate; petals none.. 1. *R. mexicana*
1. Leaves opposite; petals present.
  2. Flowers axillary, solitary.. 2. *R. ramosior*
  2. Flowers in axillary spikes.. 3. *R. indica*

1. **R. mexicana** C. & S. subsp. **pusilla** (Tul.) Koehne.

A small, glabrous, erect, annual plant usually less than 3 to 4 cm in height, generally branched from the base. Leaves linear-oblong, in threes or fours, somewhat close, 5 mm long or less, obtuse, truncate, or 2-pointed. Flowers axillary, solitary, less than 1 mm long, 4- or 5-merous, the calyx-teeth triangular. Petals none, Stamens 2 or 3, rarely 4. Capsule subglobose, about 1 mm in diameter.

In old rice paddies, Caloocan, San Juan del Monte, etc., fl. Oct.–Nov.; of very local occurrence in the Philippines. The subspecies in tropical Asia and Africa, the species in one form or another in most tropical countries.

2. 4. **R. RAMOSIOR** (L.) Koehne.

An erect, slender, simple or branched, glabrous plant 8 to 25 cm high, the stems somewhat 4-angled, usually purplish. Leaves oblanceolate to linear-lanceolate, 1.5 to 3 cm long, obtuse, base narrowed to the short petiole. Flowers small, axillary, solitary, sessile, the bracteoles about as long as the calyx, at time of flowering 2.5 to 3 mm long, the appendages longer than the lobes, spreading, lanceolate-acuminate, the lobes triangular-ovate, acute or acuminate. Petals elliptic or oblong-elliptic, pale-pink, about 1 mm long. Capsule ovoid, 3 to 4 mm long.

In open wet grass lands, fl. Oct.–Dec.; widely distributed in the Philippines. A native of North and South America, introduced in the Philippines, now widely distributed and thoroughly naturalized.

3. **R. indica** (Willd.) Koehne.

An erect, simple or branched, glabrous, annual herb 6 to 35 cm high, the stems obscurely 4-angled. Leaves sessile or subsessile, oblong, elliptic, or obovate, 8 to 15 mm long, acute or obtuse and mucronate, nerves prominent on the lower surface, margins cartilaginous. Spikes axillary, solitary, numerous, 8 to 15 mm long, the flowers numerous, in the axils of much-reduced leaves, or sometimes the spikes wanting and the flowers strictly axillary in the axils of normal leaves. Flowers subsessile. Calyx 2 to 2.5 mm long, subcampanulate, green, the lobes lanceolate, acuminate.

Petals oblong or obovate, pink, rather persistent, about half as long as the calyx-lobes. Capsules about 1.6 mm long, 2-valved, ellipsoid.

In open wet grass lands, waste places, etc., fl. Nov.–March; widely distributed in the Philippines. Caucasian region through India and Ceylon to Japan, southward to Java.

4. AMMANIA Linnaeus

Annual, slender, erect, branched, glabrous herbs growing in wet places. Leaves decussate, alternate, sessile. Flowers small, in dense, axillary clusters, 4-merous. Calyx campanulate or urn-shaped, after flowering becoming globose, 4-lobed, lobes usually not appendaged. Petals none, or 4 and small. Stamens 2 to 8, inserted on the calyx-tube. Ovary sessile. Capsule globose or ellipsoid, thinly membranaceous, bursting irregularly, the walls not horizontally striate. (In honor of J. Ammann.)

Species about 20, of wide distribution in the tropics, chiefly in Africa and Asia, 2 or 3 in the Philippines.

1. **A. baccifera** L.

An erect, branched, glabrous, slender, annual herb 10 to 50 cm high, usually more or less purplish, the stems somewhat 4-angled. Leaves oblong, oblanceolate, or narrowly elliptic, base narrowed, those of the stems sometimes 3.5 cm long, those of the branches very numerous, small, 1 to 1.5 cm long. Flowers in dense axillary clusters, pedicelled, about 1.2 mm long, green or purplish. Calyx-lobes 4, triangular, acute, about 0.6 mm long. Petals none. Stamens 4. Capsule depressed-globose, 1.2 mm in diameter, purple, irregularly circumscissile above the middle.

In open wet places, old rice fields, etc., fl. all the year; throughout the Philippines, possibly introduced. Tropical Africa and Asia through Malaya to Australia.

98. SONNERATIACEAE (SONNERATIA OR PAGATPAT FAMILY)

Erect shrubs or trees with entire, opposite, exstipulate leaves. Flowers small or large, terminal, solitary or few, or numerous and arranged in panicles. Flowers regular, perfect or polygamo-dioecious, the calyx-tube slightly united with the ovary, the segments valvate. Petals none or as many as the calyx-segments and alternate with them. Stamens as many as the calyx-segments and alternate with them, or very numerous and inserted within the rim of the calyx, the filaments in bud bent inward. Ovary 2- to 20-celled, nearly superior, the ovules numerous, in many rows. Fruit dry or somewhat fleshy, indehiscent or dehiscent, many-seeded.

Genera 2, species about 10, India to Malaya and Polynesia, both genera and 5 species in the Philippines.

SONNERATIA Linnaeus filius

Shrubs or trees, quite glabrous, with opposite, entire, thick leaves. Flowers large, terminal, solitary or two or three together. Calyx coriaceous, the tube campanulate, slightly adnate to the base of the ovary, the segments 4 to 9, ovate to lanceolate, persistent. Petals linear, as many as the calyx-segments on none. Stamens very numerous, inserted within the rim of the calyx-tube, the filaments slender, long. Ovary nearly superior, many-celled; ovules numerous in each cell; style long; stigma capitate. Fruit large, rather hard, depressed-globose, many-seeded, supported by the calyx-tube, the calyx-lobes persistent, spreading. (In honor of P. Sonnerat, a French naturalist and explorer.)

Species about 6 along the seashore in the Indo-Malayan region, 2 in the Philippines.

Leaves obovate, rounded... 1. *S. pagatpat*
Leaves oblong to elliptic-oblong, somewhat pointed.............. 2. *S. caseolaris*

1. **S. pagatpat** Blanco. Pagatpat (Tag.).

A shrub or tree reaching a height of 20 m or less. Leaves very thick, leathery, obovate, rounded, 6 to 10 cm long, often nearly as wide as long. Calyx green, leathery, 3 to 4 cm long, the segments 6 to 9, lanceolate to oblong-lanceolate, acuminate, equaling or longer than the tube. Petals white, linear, early deciduous, nearly as long as the calyx-segments (sometimes wanting). Stamens very numerous. Fruit hard, depressed-globose, 3 to 4 cm in diameter, surrounded nearly to the middle by the calyx-tube, the persistent lobes spreading.

Along tidal estuaries, fl. most of the year; throughout the Philippines along the seashore. Endemic (?), or perhaps not specifically distinct from the widely distributed Indo-Malayan *Sonneratia alba* Sm.

2. **S. caseolaris** L. Engl. (*S. acida* L. f.) Pagatpat (Tag.).

Similar to the preceding, but the leaves oblong to elliptic-oblong, somewhat pointed, rarely obtuse, 4 to 10 cm long, 2 to 4 cm wide, tapering to the base. Flowers solitary, the calyx green, 2.5 to 3 cm long, the segments 6, longer than the tube. Petals 6, linear, pink or white, about as long as the calyx-segments. Fruit about as in the preceding species. (Fl. Filip. *pl. 175*, *S. pagatpat.*)

Along tidal estuaries, but less abundant in the Philippines than the preceding. India to Malaya.

99. PUNICACEAE (POMEGRANATE OR GRANADA FAMILY)

Shrubs or small trees, the branches often spiny, the young ones 4-angled. Leaves opposite, subopposite, or clustered, entire. Flowers solitary or few at the ends of the branches, large, perfect, regular. Calyx-tube funnel-shaped, adnate to the ovary below, enlarged above the ovary, the lobes 5 to 7, persistent in fruit. Petals as many as the calyx-lobes, alternate with them, wrinkled. Stamens very numerous, inserted around the mouth of the calyx tube, bent inward in bud. Ovary united with the calyx-tube, many-celled, the cells arranged in 1 to 3-whorls. Style slender, elongated; stigma capitate; ovules many in each cell, some axillary, some parietal. Fruit a globose berry with a thick pericarp, crowned by the calyx-segments. Seeds, angular, very numerous.

A single genus with 2 species, 1 introduced in the Philippines.

1. PUNICA Linnaeus

Characters of the Family. (Latin "Phoenician" or "Carthaginian.")

1. P. GRANATUM L. Granada (Sp.); Pomegranate.

A shrub 2 to 3 m high, the branchlets slender, 4-angled, often terminating with a short spine. Leaves oblong-lanceolate to oblong-elliptic, 4 to 6 cm long, short-petioled, acute or obtuse, narrowed at both ends.

Flowers red, the calyx 2.5 to 3 cm long, the segments usually 6. Petals obovate, nearly 2 cm long. Fruit globose, reddish or purplish, about 5 cm in diameter, containing many seeds surrounded by a red pulp. (Fil. Filip. *pl. 211.*)

Occasionally cultivated, flowering most of the year; in most towns in the Philippines in cultivation, but not spontaneous, introduced by the Spaniards at an early date. A native of eastern subtropical Asia, now cultivated in most tropical and subtropical countries.

100. LECYTHIDACEAE (BARRINGTONIA OR PUTAT FAMILY)

Erect shrubs or trees with alternate, simple, entire, or toothed leaves. Flowers regular, perfect, often large and showy, in short or elongated, terminal or axillary spikes or racemes, the bracts small deciduous. Calyx-tube scarcely produced above the ovary, the limb with 3 or 4, valvate or imbricate lobes. Petals 4 or 5, imbricate. Stamens very many, the filaments slightly connate at the base. Ovary inferior, 2- to 4-celled; ovules 2 to 8 in each cell. Fruit small or large, ovoid to oblong, sometimes quadrangular, fibrous or fleshy, indehescent, 1- to several-seeded, crowned by the calyx-lobes.

Genera 18, species about 260, in all tropical countries, 2 genera and about 7 species in the Philippines.

1. BARRINGTONIA Forster

Small or large trees, usually glabrous. Leaves generally crowded at the ends of the branches, entire or toothed, often large. Flowers small or large, in short or long, terminal or axillary, erect or pendulous racemes. Calyx green, the tube adnate to the ovary, not produced above it, the segments 2 to 4. Petals usually 4, sometimes 5, imbricate, slightly connate at the base, adnate to the stamens. Stamens very numerous, in several rows, epigynous, falling with the corolla; filaments very slender, elongated, connate at the base. Ovary inferior, 2- to 4-celled, ovules several in each cell, pendulous. Fruit small or large, fibrous or leathery, often angled, indehiscent, 1-celled, containing a single large seed. (In honor of D. Barrington.)

Species about 60, eastern Africa, tropical Asia, Malaya, Australia, and Polynesia, about 7 in the Philippines.

1. Calyx quite closed in bud, splitting irregularly into 2 or 3 lobes.
    2. Leaves entire; racemes short, erect; flowers and fruit very large. 1. *B. asiatica*
    2. Leaves finely toothed; racemes pendulous, up to 60 cm in length. 2. *B. racemosa*
1. Calyx not closed in bud, with 4 equal segments; flowers and fruit small; racemes pendulous........ 3. *B. luzonensis*

1. **B. asiatica** (L.) Kurz. (*B. speciosa* Forst.). Botong (Tag.).

A tree 8 to 15 m high with large, sessile, obovate or obovate-oblong, entire, thick, shining leaves 20 to 40 cm long, apex obtuse, base narrowed. Flowers very large, in short, erect, few-flowered racemes. Calyx-tube 1 cm long, the lobes 2 or 3, oblong-ovate, concave, green, 2.5 cm long. Petals 4, thin, white, becoming brownish, oblong, 7 to 8 cm long, 3 to 4 cm wide, deciduous. Stamens very numerous, slender, united at the base, 10 to 12 cm long, white below, shading to purple above; anthers small, yellow.

Style slender, 13 cm long, purplish. Fruit obovoid, sharply 4-, rarely 5-angled, 8 to 14 cm long, 8 to 12 cm thick, containing a single large seed. (Fl. Filip. *pl. 305.*)

Along the seashore, Pasay beach, also occasionally cultivated, fl. all the year; throughout the Philippines along the seashore. Ceylon to Malaya, Australia and Polynesia.

2. **B. racemosa** (L.) Blume. Putat (Tag.).

A shrub or small tree reaching a height of 10 m, glabrous, the branches with prominent leaf-scars. Leaves at the ends of the branches, subsessile, oblong-obovate, 10 to 30 cm long, acuminate, base narrowed, margins crenate-serrate. Racemes terminal or from axils of fallen leaves, solitary, drooping, 20 to 60 cm in length. Flowers white or pink. Calyx closed in bud, splitting irregularly into 2 or 3, ovate, concave segments. Petals oblong-ovate to lanceolate, 2 to 2.5 cm long, slightly connate at the base. Stamens very numerous, 3 to 4 cm long. Fruit ovoid to oblong-ovoid, 5 to 6 cm long, somewhat 4-angled, crowned by the persistent calyx, the pericarp leathery, green or purplish. (F. Filip. *pl. 240.*)

On open low lands and thickets, fl. most of the year; throughout the Philippines near the seashore. India and Ceylon, Malaya, and Polynesia.

3. **B. luzonensis** (Presl) Rolfe. Putat (Tag.).

A glabrous tree 8 to 12 m high. Leaves somewhat crowded at the ends of the branches, oblong-obovate, 6 to 14 cm long, acuminate, base narrowed, margins uniformly and finely toothed. Racemes axillary, pendulous, 10 to 45 cm long, slender. Flowers numerous, short-pedicelled, pink to red. Calyx lobes 4, short, obtuse. Petals narrowly oblong, about 7 mm long. Fruit oblong-ovoid, somewhat 4-angled, pointed, 3 to 4 cm long, about 1.5 cm thick.

Along streams, in thickets etc., Masambong, Singalon, Paco, Pasay, etc., fl. June–Sept.; widely distributed in the Philippines. Endemic.

101. RHIZOPHORACEAE (MANGROVE OR BACAUAN FAMILY)

Trees with entire, simple, coriaceous, glabrous leaves, the stipules interpetiolar, caducous. Flowers axillary, solitary, fascicled or in depauperate cymes, perfect. Calyx more or less adnate to the ovary, the limb produced above the ovary, 4- to 14-lobed, the lobes valvate, persistent. Petals as many as the calyx-lobes, entire, notched, cleft, or lacerate. Stamens usually twice as many as the petals, in pairs opposite to and embraced by the petals. Ovary 5- to 1-celled, styles connate; ovules usually 2 in each cell, pendulous. Fruit coriaceous, indehiscent, 1-celled, 1-seeded, the seed in the typical mangrove genera germinating before the fruit falls, the large radicle perforating the apex of the pericarp.

Genera 17, species about 60, in all tropical countries, 7 genera and about 11 species in the Philippines.

Calyx-lobes and petals 4; stamens 8 .... 1. *Rhizophora*
Calyx-lobes and petals 8 to 14; stamens 16 to 28 .... 2. *Bruguiera*

1. RHIZOPHORA Linnaeus

Trees of the mangrove swamps with prop-roots, the branches marked by leaf-scars. Leaves leathery, ovate to elliptic, pointed. Flowers 2 or more, on short axillary peduncles. Calyx 4-lobed, the bracteoles at the base connate. Petals 4, entire. Ovary half-inferior. Fruit ovoid, pendulous the calyx lobes persistent, reflexed, the radicle germinating on the tree, long-protruded, perforating the apex of the fruit. (Greek "root" and "to bear.")

Species about 5, tropics generally, on muddy seashores, along tidal-streams, etc., characteristic trees of the mangrove swamps, 2 in the Philippines.

Peduncles much shorter than the petioles, 2-flowered............	1. *R. conjugata*
Peduncles about as long as the petioles, 3- to 7-flowered........	2. *R. mucronata*

1. **R. conjugata** L. Bacao, Bacauan (Tag.).

A tree of the mangrove swamps, up to 12 m high, with prop-roots. Leaves coriaceous, green and shining, oblong-elliptic, 10 to 16 cm long, apex acute or mucronate, base acute. Penducles from the axils of fallen leaves, shorter than the petioles, 2-flowered. Flowers sessile. Fruit ovoid, pendulous, brown or olivaceous, about 4 cm long, the persistent calyx-lobes reflexed, the protruded radicle green, cylindric, 20 to 40 cm long. (Fl. Filip. *pl. 135*, *R. mucronata.*)

Along tidal streams, fish-ponds, etc., Malabon, fl. most of the year; throughout the Philippines along tidal streams, one of the characteristic trees of the mangrove swamps. Tropical shores of Asia, Africa, and Malasia.

2. **R. mucronata** Lam. Bacao, Bacauan (Tag.).

Very similar to the preceding species, and with the same habit. Leaves oblong-elliptic, coriaceous, shining, up to 16 cm long, apex with a slender mucro. Peduncles axillary, 2.5 to 4 cm long, about as long as the petioles, forked at the apex, bearing from 3 to 7 flowers. Flowers and fruit about as in the preceding species.

In mangrove swamps, along tidal streams, etc., fl. most of the year. Range about the same as for *R. conjugata.*

2. BRUGUIERA Lamarck

Trees or shrubs of the mangrove swamps with prop-roots, glabrous. Leaves entire. Flowers axillary, solitary or cymose, small or large. Calyx split into 8 to 14 narrow lobes, obconical or campanulate. Petals oblong, 2-lobed or emarginate, appendiculate. Stamens 16 to 28; anthers linear, mucronate, about as long as the filaments. Ovary 2- to 4-celled. Fruit included in or adnate to the calyx-tube, 1-celled, 1-seeded, germinating on the tree. (In honor of J. G. Bruguieres.)

Species about 7, along the seashores and tidal streams in the tropics of the Old World, characteristic of the mangrove swamps, 4 in the Philippines.

Flowers about 3 cm long..	1. *B. eriopetala*
Flowers about 1 cm long..	2. *B. cylindrica*

1. **B. eriopetala** W. & A. Pototan, Busain, Bacauan (Tag.).

A small or large tree, the young branches usually slender. Leaves coriaceous, shining, oblong-elliptic to oval-oblong, acute at both ends, 8 to 16 cm. long. Flowers yellow, axillary, solitary, 3 cm long, the pedicels decurved. Calyx-lobes usually 10. Petals shorter than the calyx-lobes, cleft at the apex, bearing a stout seta in the sinus, the edges clothed with long hairs, each lobe bearing a short, apical bristle. Fruit small, the seed germinating on the tree and forming a cylindric radicle 30 cm long or more prior to its fall. (Fl. Filip. *pl. 415, B. polyandra.*)

Along tidal estuaries, common about Malabon, fl. all the year; along tidal streams throughout the Philippines. Malaya to Australia.

The very closely allied *Bruguiera gymnorrhiza* Lam., also occurs in the Philippines, but I have seen no specimens from our area. It differs from *B. eriopetala* chiefly in its petals being nearly glabrous above, and with 2 to 4 bristles on each lobe.

2. **B. cylindrica** (L.) Blume (*B. caryophylloides* Blume). Bacauan, Busain (Tag.).

A glabrous tree 4 to 8 m high. Leaves rather thin, 7 to 12 cm long, shining, elliptic-oblong, narrowed at both ends, acute or acuminate. Inflorescence in the upper axils, about as long as the petioles, the pedicels umbellately 2- or 3-flowered. Flowers greenish, about 1 cm long, the calyx 7- or 8-cleft, the lobes linear, longer than the bifid petals, the latter bearing 3 or 4 bristles at the tip of each lobe and one in the notch. (Fl. Filip. *pl. 136.*)

In mangrove swamps, Malabon, fl. most of the year; widely distributed in the Philippines in mangrove swamps. India to Formosa, southward to Malaya.

102. COMBRETACEAE[1] (TEMINALIA OR TALISAY FAMILY)

Trees, shrubs, or woody vines. Leaves alternate or opposite, entire. Flowers spicate or racemose, the spikes or racemes sometimes panicled. Calyx-tube adnate to the ovary and produced above it, the limb of 4 or 5 valvate lobes. Petals 4 or 5, or wanting. Stamens as many as, or twice as many as the calyx-lobes, inserted on the calyx. Ovary inferior, 1-celled; ovules few, pendulous. Fruit coriaceous or drupe-like, indehiscent, ovoid, angular, or longitudinally winged or keeled.

Genera 15, species about 250, of wide tropical distribution, 4 genera and 18 species in the Philippines.

1. Petals none; large trees with small flowers .... 1. *Terminalia*
1. Petals present; trees, shrubs, or vines.
    2. Calyx-tube slender, produced 4 to 7 cm beyond the ovary; vines. 2. *Quisqualis*
    2. Calyx-tube short.
        3. Erect shrubs or trees; calyx persistent, fruit not winged. 3. *Lumnitzera*
        3. Vines with winged fruits, the calyx deciduous .... 4. *Combretum*

1. TERMINALIA Linnaeus

Large trees with opposite or subopposite leaves more or less crowded at the ends of the branches, often glandular at the base or on the petioles. Flowers small, spicate or racemose, sometimes panicled, perfect, or the upper ones males. Calyx-tube produced above the ovary, the limb campanulate, 5-lobed, deciduous. Petals none. Stamens 10. Ovary 1-celled, inferior. Fruit ovoid, usually compressed and keeled or winged, indehiscent, 1-seeded. (From the Latin, on account of the crowded terminal leaves and flowers of most species.)

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[1] For a consideration of the known Philippine species of this family see Merrill, E. D., "A Preliminary Revision of Philippine Combretaceae." *Philip. Journ. Sci.* 4 (1909) *Bot.* 614–650.

Species about 100, tropics generally, but mostly in Africa, Asia, and Malaya, about 11 in the Philippines, a single one in our area.

1. **T. catappa** L. Talisay (Tag.); Almendras (Sp.-Fil.); Lugo (Il.); Indian Almond.

A large tree, sometimes reaching a height of 25 m, glabrous or nearly so. Leaves shining, obovate, tapering below to the narrow and cordate base, 10 to 25 cm long, the petioles short. Flowers white, small, spicate, the spikes axillary, simple, 6 to 18 cm long. Fruit compressed, ellipsoid in outline, prominently 2-ridged or keeled down the sides, 3 to 6 cm long. (Fl. Filip. *pl. 144.*)

Cultivated to some extent in Manila for a shade tree, fl. most of the year; widely distributed in the Philippines near the seashore. India to Malaya, planted in many other tropical countries.

2. QUISQUALIS Linnaeus

Scandent shrubs. Leaves opposite, entire. Flowers long, in short axillary or terminal spikes. Calyx-tube slender and much prolonged above the ovary, deciduous, its limb 5-lobed. Petals 5. Stamens 10, short. Ovary 1-celled; style filiform. Fruit 5-angled or 5-winged. Seed solitary. (Latin "who" and "of what kind," probably originally adopted on account of uncertainty as to the proper alliances of the genus.)

Species 4 or 5 in tropical Asia and Africa, 1 in the Philippines.

1. **Q. indica** L. Niogniogan, Tangolon (Tag.).

A scandent shrub reaching a length of from 2 to 8 m, the younger parts rusty-pubescent. Leaves oblong to elliptic, 7 to 15 cm long, acute or slightly acuminate, base rounded. Spikes shorter than the leaves, many-flowered, the bracts ovate to lanceolate, persistent, 8 to 14 mm long. Flowers fragrant, white to pink or reddish-purple. Calyx-tube very slender, produced above the ovary for from 4 to 7 cm, the lobes 5, short, acute. Petals oblong, obtuse, 10 to 15 cm long. Fruit narrowly ellipsoid, 2.5 to 3 cm long, sharply longitudinally 5-angled or 5-winged. (Fil. Filip. *pl. 133.*)

Occasional in thickets and often cultivated, fl. at intervals all the year; common and widely distributed in the Philippines. Burma to China, through Malaya to New Guinea, cultivated in other tropical countries.

3. LUMNITZERA Willdenow

Glabrous shrubs or trees growing along the sea shore and tidal streams. Leaves somewhat fleshy when fresh, alternate, somewhat crowded toward the ends of the branchlets, shortly petioled, shining, obovate to oblong-obovate, entire. Flowers in axillary or terminal racemes. Calyx-tube produced above the ovary, the base with 2 small bracteoles, the teeth 5. Petals 5, oblong. Stamens 10 or fewer. Ovary inferior, 1 celled; ovules 2 to 5, pendulous. Fruit woody, elliptic-oblong, smooth or longitudinally striate, 1-seeded. (In honor of S. Lumnitzer.)

Species 2 or 3, seashores in the tropics of the Old World, 2 in the Philippines.

1. **L. racemosa** Willd. Solasi (Tag., in Parañaque and Maricaban).

A shrub or a small tree, flowering when 1 m high or less. Leaves fleshy, green, shining, narrowly obovate, 2.5 to 7 cm long, apex rounded, retuse, gradually narrowed to the acute base, short-petioled. Racemes axillary, 2 to 6 cm long. Calyx oblong-cylindric, green, 5 to 6 mm long, the teeth short. Petals white, oblong, about 4 mm long. Stamens 10, as long as the petals. Fruit green, oblong, about 1.5 cm long, crowned by the persistent calyx-rim. (Fl. Filip. *pl. 126.*)

Along tidal streams, Maricaban, Parañaque, etc., fl. Dec.–Mar., here 2 m high or less; occasional in similar habitats in the Philippines. Tropical shores of Africa and Asia, through Malaya to Australia and Polynesia.

The one other species found in the Philippines, *L. littorea* (Jack) Voigt (*L. coccinea* W. & A.), is distinguished by its terminal inflorescence, crimson flowers, and its stamens about twice as long as its petals; it has not been found in our area, but is much the commoner species of the two in the Philippines.

4. COMBRETUM Linnaeus

Scandent shrubs or suberect with pendulous branches. Leaves opposite, entire, petioled. Flowers usually in panicled spikes or racemes, polygamo-dioecious, bracteoles small. Calyx-tube slender below, slightly contracted above the ovary, then expanded and ovoid, funnel-shaped, or tubular, the limb 4- or 5-toothed. Petals 4 or 5, inserted on the calyx-limb, small. Stamens twice as many as the petals, inserted in 2 series. Ovary inferior, 1-celled; ovules 2 to 5. Fruit indehiscent, dry, 4- or 5-winged. (A Latin name of uncertain application.)

Species about 130, tropics generally, 4 in the Philippines.

1. **C. squamosum** Roxb.

A scandent shrub reaching a length of 5 m or more. Leaves opposite, elliptic-ovate, glabrous on the upper surface, beneath covered with small round scales, apex acute or shortly acuminate, base rounded, 8 to 16 cm long. Inflorescence 6 to 15 cm long, axillary, of racemosely arranged scaly spikes, the spikes 3 to 6 cm long. Flowers white, the calyx-tube slender below, expanded above, the limb about 4 mm long, funnel-shaped. Petals small. Fruit 2 to 2.5 cm long, broadly 4-winged.

In thickets, Masambong, fl. Dec.–Jan.; widely distributed in the Philippines. India to Malaya.

103. MYRTACEAE[1] (MYRTLE OR DUHAT FAMILY)

Trees or shrubs with opposite, rarely alternate, simple, entire or toothed, often pellucid-dotted leaves, exstipulate, or stipules very small and deciduous. Flowers regular, perfect, solitary, or in spikes, corymbs, or heads. Calyx 4- or 5-toothed or lobed, the limb persistent or deciduous. Petals free, or sometimes united into a disk-like operculum, alternating with the calyx-lobes, or rarely wanting. Stamens very many, rarely few, inserted on the disk with the petals. Ovary inferior, 1- to many-celled; ovules numerous; style simple. Fruit fleshy or capsular, indehiscent or dehiscent, 1- to many-seeded.

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[1] For the Philippine species of this family see Robinson, C. B., "A Preliminary Revision of Philippine Myrtaceae." *Philip. Journ. Sci.* 4 (1909) *Bot.* 331–407.

Genera 74, species about 3,000, tropical and subtropical regions of both hemispheres, 10 genera and over 120 species in the Philippines.

1. Fruit a dehiscent capsule; flowers umbellate........................ 1. *Eucalyptus*
1. Fruit indehiscent, fleshy.
    2. Leaves glabrous; fruit few-seeded.. 2. *Eugenia*
    2. Leaves pubescent; fruit many-seeded.. 3. *Psidium*

1. EUCALYPTUS L'Héritier

Trees with opposite or alternate, coriaceous, horizontal or vertical, glabrous leaves, very variable in shape, the nerves slender. Flowers small to large, in axillary or lateral, peduncled, solitary umbels. Calyx-tube obconic, campanulate, or oblong, adnate to the ovary, truncate, entire or with 4 minute teeth, the orifice closed by a hemispheric, conical, or elongated, thin or thick, fleshy or woody operculum, covering the stamens in bud, and falling off entire, apparently formed of the concrete petals. Stamens numerous. Ovary inferior, summit flat, convex or conical, 3- to 6-celled. Fruit composed of the more or less hardened, truncate, calyx-tube enclosing the capsule, opening at the apex by as many valves as there are cells. Seeds few to many, small. (Greek "well" and "conceal," in allusion to the operculum covering the stamens in bud.)

Species 150 or more, mostly Australian, a few in Malaya, in the Philippines 1 indigenous in Mindanao and a few Australian species introduced and cultivated.

*1. E. TERETICORNIS Sm. Blue Gum.

A tree reaching a height of 15 m or more, the bark grayish, peeling off in thin layers. Leaves coriaceous, lanceolate, usually somewhat falcate, 10 to 25 cm long, pale, the nerves ascending. Peduncles axillary or lateral, up to 1.5 cm long, each with 3 to 8 short-peduncled flowers. Flowers white, about 1.5 cm in diameter when expanded, the calyx-tube obconic, about 6 mm in diameter. Operculum about 10 mm long, conic-rostrate. Fruit obovoid or subglobose, about 8 mm in diameter, protruded beyond the calyx-rim and apiculate.

Occasionally cultivated, but not spontaneous, fl. Feb.–Mar. A native of Australia, now cultivated in many other warm countries.

8. EUGENIA Linnaeus

Glabrous trees or shrubs with opposite, rarely alternate, usually coriaceous leaves. Inflorescence terminal, axillary, lateral, or sometimes cauline, the flowers solitary, fascicled, or in short racemes, cymes, or panicles. Calyx-tube globose, ovoid, funnel-shaped, or sometimes elongated, the lobes 4, rarely 5. Petals 4, rarely 5 or none, free or united in a calyptra. Stamens very many. Ovary 2-, rarely 3-celled; style filiform; ovules many in each cell. Fruit fleshy, rarely dry and fibrous, berry-like or drupe-like, few-, often only 1-seeded. (In honor of Prince Eugene of Saxony.)

Species more than 700 in the tropics of both hemispheres, about 100 in the Philippines.

1. Flowers small, the calyx less than 6 mm long; petals cohering and falling as a whole.. 1. *E. jambolana*
1. Flowers large, the calyx 1 cm long or more; petals free.

2. Flowers 5 to 6 cm in diameter, in short racemes from the branches below the leaves........ 2. *E. malaccensis*
2. Flowers 3 to 4 cm in diameter, in axillary or terminal, few- to many-flowered recemes, or cymose panicles.
    3. Leaves lanceolate, gradually narrowed at both ends, slenderly acuminate........ 3. *E. jambos*
    3. Leaves elliptic, to ovate-oblong, obtuse or blunt-acuminate, base rounded or subcordate.
        4. Fruit turbinate, pink or red, crowned by the inflexed, much thickened, fleshy calyx-lobes........ 4. *E. javanica*
        4. Fruit ovoid or ellipsoid, greenish-white, the persistent calyx-lobes thin, not inflexed........ 5. *E. calubcob*

1. E. JAMBOLANA Lam. Duhat, Lumboy (Tag.).

A tree 4 to 15 m high, quite glabrous. Leaves shining, leathery, oval to elliptic or obovate-elliptic, shortly and broadly acuminate, 6 to 12 cm long, the nerves numerous, slender. Panicles mostly from the branchlets below the leaves, some often axillary or terminal, 4 to 6 cm long. Flowers numerous, pink or nearly white, sessile in crowded fascicles on the ends of the branchlets. Calyx funnel-shaped, about 4 mm long, 4-toothed. Petals cohering and falling as a small disk. Stamens about as long as the calyx. Fruit oval to elliptic, dark-purple, or nearly black, fleshy, edible, 1.5 to 2 cm long containing a single large seed. (Fl. Filip. *pl. 174, Syzygium jambolanum.*)

Common, fl. Feb.–March; throughout the Philippines cultivated and wild, but certainly introduced. India, through Malaya, to Australia, often, perhaps, only cultivated.

* 2. E. MALACCENSIS L. Macopa, Macopa-calabao (Tag.).

A tree reaching a height of about 10 m. Leaves elliptic-oblong to broadly oblong-lanceolate, 10 to 25 cm long, narrowed at both ends, apex acuminate, base acute. Racemes short, few-flowered, from the branches below the leaves, 6 cm long or less. Flowers large, showy, deep red-purple, 5 to 6 cm in diameter, the calyx-tube 2 cm long, green, the lobes 1 cm wide. Petals obovoid, nearly 1.5 cm long. Fruit subglobose or depressed-turbinate, crowned by the incurved calyx-lobes. (Fl. Filip. *pl. 170.*)

One tree known to me in our area, opposite San Pedro Macati, fl. April–May; widely distributed in the Philippines in cultivation and certainly introduced. India to Malaya, frequently only planted, and now introduced in many other tropical countries.

* 3. E. JAMBOS L. Tampoi (Tag.).

A tree reaching a height of about 10 m. Leaves lanceolate, 10 to 20 cm long, acuminate, base acute, short-petioled. Racemes terminal, few-flowered, 4 to 6 cm long. Flowers white, pink, or red, 4 to 5 cm in diameter. Calyx obconic, the lobes 4. Fruit ovoid or globbose, fleshy, pink or red. 2.5 to 4 cm in diameter, crowned by the calyx-lobes.

Occasionally cultivated, fl. Jan.–April; widely distributed in the Philippines, but undoubtedly introduced. India to southern China, Malaya, and Australia, often, perhaps, only planted.

* 4. E. JAVANICA L. Macopa (Tag.); Malay Apple.

A tree reaching a height of 12 m. Leaves subsessile, elliptic-oblong, apex rounded or obtusely acuminate, base rounded or subcordate, 12 to 20 cm long. Inflorescence axillary, sometimes terminating short branches, 7 to 15 cm long. Flowers white, 3 to 4 cm in diameter, few to many. Fruit pink, fleshy, edible, turbinate, 3 to 4 cm long and thick, apex depressed, crowned by the much thickened, fleshy, incurved calyx-lobes.

Commonly cultivated, fl. Mar.–April; widely distributed in the Philippines in cultivation, certainly introduced. Malay Peninsula and Archipelago.

5. **E. calubcob** C. B. Rob. Calubcob (Tag.).

A shrub or tree 6 to 30 m in height. Leaves subsessile or short-petioled, elliptic to ovate or oblong, 7 to 23 cm long, apex blunt-acuminate, base rounded or subcordate. Inflorescence terminal or lateral, 6 to 18 cm long, few- to many-flowered. Flowers white, 3 to 4 cm in diameter. Calyx-tube about 1 cm long. Petals 6 to 8 mm in diameter, orbicular-ovate. Fruit ellipsoid to ovoid, greenish-white, edible, fleshy, 4 to 5 cm long, crowned by the thin, not inflexed, persistent calyx-lobes. (Fl. Filip. *pl. 145, E. montana.*)

Old Botanic Garden, fl. March–May; widely distributed in the Philippines. Endemic.

3. PSIDIUM Linnaeus

Trees or shrubs with opposite entire leaves. Flowers axillary, on 1- to few-flowered peduncles, white. Calyx urn-shaped or obovate, the limb 4- or 5-lobed. Petals 4 or 5, free. Stamens very many. Ovary 2-celled, inferior; ovules many in each cell. Fruit a globes to ellipsoid or obovoid, fleshy, many-seeded berry, crowned by the calyx-lobes. (Greek name of the pomegranate.)

Species about 100 in tropical and subtropical America, 2 introduced in the Philippines.

1. P. GUAJAVA L. Bayabas (Tag.); Guayaba (Sp.); Guava.

A shrub or small tree reaching a height of 8 m, somewhat pubescent. Young branches 4-angled. Leaves oblong to elliptic, 5 to 12 cm long, acute or somewhat acuminate, base usually rounded, the nerves prominent. Peduncles 1- to 3-flowered. Flowers white. Sepals green, 1 to 1.5 cm long. Petals broad 1.5 to 2 cm long. Fruit globose to ovoid or obovoid, 4 to 5 cm long, green, turning yellowish when ripe, somewhat aromatic, the pulp pink or nearly white, edible. (Fl. Filip. *pl. 48, P. pyriferum.*)

Common in our area, fl. most of the year. A native of Mexico, now found throughout the Philippines and thoroughly naturalized. Most tropical countries.

104. MELASTOMATACEAE (MELASTOMA OR CULIS FAMILY)

Herbs, shrubs, climbing vines, or trees. Leaves opposite, sometimes whorled, entire, palmately or pinnately nerved; stipules none. Flowers perfect, regular, in lateral or terminal fascicles or panicles. Calyx-tube united with the ovary, 3- to 6-lobed or truncate. Petals as many as the calyx-lobes. Stamens as many as the petals, twice as many, or more numerous, the alternate ones frequently shorter; filaments bent inward in bud; anthers opening by apical pores, rarely by lateral slits, the connective often appendaged or spurred below. Ovary 4- to 6-celled, or in *Memecyclon* 1-celled; style simple; ovules very many. Fruit included in the calyx-tube, berry-like or capsular.

Genera 170, species about 3,000, in all tropical countries, few in temperate regions, 15 genera, and over 100 species in the Philippines.

1. MEMECYLON Linnaeus

Glabrous shrubs or trees with coriaceous, opposite, usually penninerved leaves. Flowers in small, axillary or terminal, simple or panicled cymes or umbels. Calyx-tube campanulate, the limb truncate or 4-lobed. Petals 4, usually blue or purple. Stamens 8, equal; anthers short, opening by slits, the connective ending in a posterior horn. Ovary inferior, 1-celled, surmounted by a convex or depressed, 8-grooved disk; ovules 6 to many on a free central placenta. Fruit a globose 1-seeded berry or drupe, crowned by the calyx-rim. (A name used by Dioscorides for a strawberry-like fruit.)

Species about 100, tropical Asia to Africa, through Malaya to Australia and Polynesia, 10 in the Philippines.

1. **M. umbellatum** Burm. (*M. edule* Roxb.) Culis (Tag.).

A glabrous shrub or small tree reaching a height of 6 to 8 m. Leaves coriaceous, 6 to 14 cm long, oblong-ovate to oblong-elliptic, green, shining, acuminate, base usually decurrent-acuminate, sometimes acute or rounded. Cymes axillary, solitary or fascicled, 2 to 4 cm long, peduncled, the flowers numerous, subumbellately disposed on the branchlets. Flowers deep-blue or purple. Calyx funnel-shaped. Petals about 2 mm long. Fruit globose, fleshy, dark-purple, 5 to 8 mm in diameter. (Fl. Filip. *pl. 373*, *M. tinctorium.*)

In thickets opposite Guadalupe, San Francisco del Monte, etc., fl. Nov.–Jan. and probably in other months; common and widely distributed in the Philippines, variable. India to Australia.

105. OENOTHERACEAE (EVENING PRIMROSE FAMILY)

(*Onagraceae*)

Herbs, sometimes suffrutescent, often growing in wet places, sometimes aquatic. Leaves opposite or alternate, simple, entire or toothed. Flowers perfect, regular or nearly so, mostly axillary and solitary. Calyx-tube adnate to the ovary, the limb 2- to 5-lobed. Petals epigynous, free, as many as the calyx-lobes. Stamens as many, or twice as many, as the petals. Ovary inferior usually 4-celled, but from 1- to 6-celled; style simple; ovules many in each cell, in our genera. Fruit in our genera an elongated, cylindric or angular, dehiscent capsule.

Genera 38, species 475, in all parts of the world, 3 genera and 7 species in the Philippines.

Stamens as many as the calyx-lobes.. 1. *Ludwigia*
Stamens twice as many as the calyx-lobes.................................. 2. *Jussiaea*

1. LUDWIGIA Linnaeus

Erect, simple or branched herbs with alternate, nearly or quite entire leaves. Flowers small, yellow, axillary, solitary, sessile or nearly so, the pedicels 2-bracteolate. Calyx-tube linear, the teeth 3 to 5, persistent. Petals 3 to 5. Stamens inserted with and as many as the petals. Ovary inferior, 4- or 5-celled; ovules very numerous. Capsule oblong or linear, opening by terminal pores or breaking up irregularly. (In honor of C. G. Ludwig, a German botanist.)

Species about 20, mostly in North America, 2 widely distributed in the tropics of the Old World, both in the Philippines.

Pods stout, 6 to 8 mm long, about 2.5 mm thick, seeds not showing through the capsule walls.......... 1. *L. parviflora*

Pods slender, 1 to 1.5 cm long, 1 to 1.5 mm thick, 4-angled, seeds distinctly showing through the capsule walls.......... 2. *L. prostrata*

1. L. **PARVIFLORA** Roxb.

An erect, branched, glabrous, annual herb 10 to 30 cm high or more, stems often purplish, terete. Leaves lanceolate, acute, 2 to 6 cm long, base narrowed. Flowers axillary, solitary, 4-merous, shortly pedicelled. Calyx-lobes oblong, acuminate, green, reflexed, about 2 mm long. Petals yellow, oblong-elliptic, 3 mm long, spreading. Capsules oblong, subcylindric, with 4 rounded angles, green or purplish, 6 to 8 mm long, the seeds in several rows in each cell, not distinguishable through the cell-walls.

In open wet grass lands and waste places, fl. Oct.–Feb., and probably in other months; widely distributed in the Philippines, probably introduced. India, through Malaya to northern Australia.

2. L. **PROSTRATA** Roxb.

An erect or ascending, branched, glabrous, annual herb with angled stems 20 to 60 cm high. Leaves oblong-lanceolate to lanceolate, narrowed at both ends, acuminate, the larger ones 6 to 8 cm long, few or many smaller ones intermixed. Flowers small, 4-merous, axillary, solitary, sessile, the calyx-lobes and petals about 2 mm long. Capsules linear, 4-angled, slender, 1 to 1.5 cm long, 1 to 1.5 mm thick, the seeds in one row in each cell, distinctly showing through the cell walls.

Old rice paddies, Caloocan, Masambong, etc., fl. Oct.–Dec., and probably in other months; widely distributed in the Philippines, probably an introduced plant here. India to Japan southward to Malaya.

2. JUSSIAEA Linnaeus

Erect, often suffrutescent, or prostrate and spreading herbs growing in wet or marshy places. Leaves alternate, entire or nearly so. Flowers yellow or white, axillary, solitary, the pedicels usually 2-bracteolate. Calyx-tube linear, the teeth 4 to 6, persistent, linear. Petals 4 to 6, epigynous. Stamens twice as many as the petals, inserted with them. Ovary 4- or 5-celled; ovules many, in several axile rows in each cell. Capsule linear, round, or angular, 4- or 5-celled, 8- or 10-ribbed, septicidal or opening irregularly. (In honor of A. L. de Jussieu, a French botanist.)

Species about 36, in all tropical countries, most numerous in America, 3 in the Philippines.

1. A spreading or floating aquatic plant with obovate leaves and 5-merous white flowers.......... 1. *J. repens*
1. Erect, herbaceous or suffrutescent, usually branched, the leaves lanceolate, the flowers 4-merous, yellow.
    2. Flowers large; pods about 5 mm thick.......... 2. *J. suffruticosa*
    2. Flowers small; pods 1 to 2 mm thick.......... 3. *J. linifolia*

1. **J. repens** L.

A creeping or floating, glabrous, herbaceous plant, the leaves obovate to oblong-obovate, rounded or obtuse, 1.5 to 5 cm long, the floating stem frequently with cylindric white vescicles at the nodes. Flowers axillary, pedicelled, 5-merous, the calyx-lobes lanceolate, about 7 mm long. Petals obovate, white, pale-yellow at the base, about 12 mm long. Capsule linear, cylindric, 2 to 3 cm long, about 3 mm in diameter, base narrowed, somewhat longitudinally ridged.

In muddy places, pools of stagnant water, slow streams etc., fl. most of the year; widely distributed in the Philippines. All tropical countries.

2. **J. suffruticosa** L.

A stout, coarse, erect, glabrous or somewhat pubescent, more or less branched, often suffrutescent herb 0.4 to 1.5 m high. Leaves lanceolate, acuminate, 6 to 15 cm long. Flowers axillary, sessile or nearly so. Calyx green. Petals 4, yellow, orbicular-obovate, about 1 cm long. Capsules green or purplish, 3 to 5 cm long, 5 mm thick or less, 8-ribbed, the persistent calyx-lobes, oblong-ovate, acute or acuminate, about 1 cm long.

In open damp or wet lands, fl. all the year; throughout the Philippines. In most tropical countries.

3. J. LINIFOLIA Vahl. Silasila (Tag.).

An erect, branched, glabrous annual, 20 to 60 cm high, with green or purplish, 3- or 4-angled or winged stems, and spreading, 3-angled branches. Leaves narrowly elliptic-lanceolate or oblong-lanceolate, acute, base decurrent on the petiole, 4 to 10 cm long. Flowers axillary, solitary, sessile, the calyx-tube slender, about 8 mm long, the calyx-lobes 4, green, lanceolate, acuminate, nearly 4 mm long. Petals 4, narrowly oblong-elliptic, as long as the sepals. Stamens 8. Stigma globose. Capsule green or purplish, about 3 cm long, 1 to 2 mm in diameter, the seeds faintly or not visible through the walls.

In open wet places, old rice fields, etc., common, fl. all the year; throughout the Philippines. A native tropical America, introduced and naturalized here and probably also in the Malay Archipelago.

106. ARALIACEAE (GINSENG OR PAPUA FAMILY.)

Herbs, shrubs, or trees sometimes climbing, smooth or prickly. Leaves alternate, rarely subopposite, simple, entire or variously lobed, digitate, or 1- to 3-pinnate. Flowers small, regular, perfect or polygamo-dioecious, in umbels, racemes, or panicled heads, the pedicels continuous or jointed. Calyx-tube adnate to the ovary, the limb none, or truncate, or toothed Petals 5, rarely more, valvate or imbricate, spreading, or coherent and falling as a whole. Stamens as many as the petals, alternate with them, inserted around the disk, rarely more numerous. Ovary inferior, 1- to 6-celled, rarely more; styles as many as the cells, free or united; ovules 1 in each cell. Fruit coriaceous or drupaceous, small, cells 1 to 5 or 6 or more, the endocarp usually ridged.

Genera 54, species 650, in all parts of the world, chiefly tropical, 10 genera and 50 species in the Philippines.

Leaves simple, pinnate, or pinnately decompound.................... 1. *Nothopanax*
Leaves palmately compound.. 2. *Schefflera*

1. NOTHOPANAX Miquel

Polyscias

Glabrous unarmed shrubs with alternate, simple, pinnate, or pinnately decompound leaves. Flowers small, polygamous, in panicled umbels, 5-merous. Calyx-tube obconical, the limb with 5 minute teeth. Petals 5, valvate, triangular-ovate, base broad. Stamens 5, inserted with the petals and alternate with them. Ovary inferior, 2- or 3-celled; styles 2 or 3, very short. Fruit somewhat drupe-like, compressed or 3-angled. (Greek "false" and *Panax*, an allied genus.)

1. Leaves simple, rounded, somewhat saucer-like................ 1. *N. cochleatum*
1. Leaves pinnate.
   2. Leaflets 11 to 17, frequently pinnately lobed, pale-green or yellowish. 2. *N. ornatum*
   2. Leaflets 5 to 7, margined or mottled with white............ 3. *N. guilfoylei*
1. Leaves 2-pinnate or 3-pinnate.
   2. Leaflets broadly obovate to oblong-obovate, the leaves ternately decompound... 4. *N. crispatum*
   2. Leaflets linear-lanceolate to narrowly ovate, acuminate, the leaves pinnately decompound.. 5. *N. fruticosum*

* 1. N. COCHLEATUM (Lam.) Miq. (*Panax cochleatum* DC.). Platitos (Sp.-Fil.).

An erect shrub 1.5 to 3.5 m high with simple, suborbicular, cordate, somewhat concave, saucer-like leaves 6 to 12 cm in diameter, the margins distantly spinulose-dentate. Umbels dense, paniculate.

Commonly cultivated, but rarely or never flowering here. Cultivated throughout Malaya and Polynesia, certainly introduced in the Philippines.

* 2. N. ORNATUM (Bull.) Merr. (*Panax ornatum* Bull.).

An erect, slightly branched shrub, 1 to 3 m high. Leaves pale-green, the younger ones yellowish, pinnate, 30 to 60 cm in length. Leaflets 11 to 17, lanceolate to oblong-lanceolate, acuminate, irregular in shape and size, 8 to 20 cm long, deeply and narrowly pinnately lobed to irregularly toothed, some teeth coarse, others fine, all sharply pointed. Panicles in the upper axils or terminal, up to 40 cm long, somewhat pendulous, diffuse. Flowers greenish-white. Fruit dark-purplish, somewhat fleshy when fresh, ovoid, 5 mm long, when dry more or less 3-sulcate, 3-celled.

Quite commonly cultivated, fl. Feb.–March, and probably in other months. Thought to have originated in Brazil, but apparently now widely distributed in the tropics in cultivation.

* 3. N. GUILFOYLEI (Cogn. & Marché) Merr. (*Aralia guilfoylei* Cogn. & Marché).

An erect shrub 2 to 3 m high, slightly branched. Leaves pinnate, 20 to 50 cm long. Leaflets 5 to 7, ovate to elliptic-ovate, 5 to 13 cm long, margins distantly, prominently, and sharply serrate, apex obtuse, base often slightly inequilateral, the margins white, the upper surface also frequently blotched with white.

Commonly cultivated, rarely or never flowering here. Probably a native of Polynesia, but now widely cultivated in Malaya and in other regions.

A form apparently exactly the same except that the leaves are uniformly gree, not margined or mottled with white, is also found in cultivation, which may be *N. pinnatum* Miq.

* 4. N. CRISPATUM (Bull.) Merr. (*Panax crispatum* Bull.).

An erect shrub 1 to 2 m high. Leaves up to 20 cm long, ternately decompound, the leaflets oblong-obovate to broadly obovate, borne in threes on the ultimate branchlets of the rachis, green, 2 to 4 cm long, obtuse, base usually acute, margins deeply, coarsely, and irregularly toothed, the teeth usually spinulose.

Commonly cultivated, apparently never or very rarely producing flowers here. Thought to have originated in Brazil, but now widely distributed in cultivation.

This and the preceding two species are commonly known in Manila as "Papua de China."

* 5. N. **FRUTICOSUM** (L.) Miq. (*Panax fruticosum* L.). Papua (Tag.).

An erect shrub 1 to 2.5 m high, the leaves up to 30 cm long, decompound, 3-pinnate, the pinnae 6 to 10, shorter upward, the leaflets and ultimate segments very diverse in form, mostly lanceolate, acuminate, sharply and irregularly spinulose-toothed, often lobed, 5 to 10 cm long, the terminal segments usually larger than the others and more often lobed. Inflorescence terminal and in the upper axils, up to 15 cm long, many-flowered. Flowers umbellate, shortly pedicelled. Fruits compressed, very broadly ovoid, about 4 cm long. (Fl. Filip *pl. 78.*)

Very commonly cultivated and extremely variable in vegetative parts, rarely flowering; certainly not a native of the Philippines, but probably of prehistoric introduction. In cultivation India to Malaya and Polynesia, probably a native of one of the last two regions.

* Var. **PLUMATUM** (Hort.) (*Panax plumatum* Hort.).

Differing from the species in its smaller leaves, up to 20 cm long, the ultimate segments much smaller and finer, mostly lanceolate or linear-lanceolate, spinulose-toothed, acuminate, 1 to 5 cm long, 2 to 5 mm wide. Leaves green.

Cultivated only.

* Var. **VICTORIAE** (Hort.) (*Panax victoriae* Hort.).

Somewhat intermediate in leaflet-form between the species and the preceding variety, but leaflets somewhat glaucous on the upper surface, margined with white, pale and shining on the lower surface.

Cultivated only.

2. SCHEFFLERA Forster

Erect, unarmed shrubs or trees, or vines, the leaves palmately compound, the leaflets usually coriaceous and entire, sometimes toothed. Umbels in racemes or panicles, usually terminal, few to many-flowered, the pedicels not jointed under the flowers. Calyx truncate or toothed. Petals 5 or 6, sometimes more numerous, valvate. Stamens as many as the petals, the disk small or large. Fruit globose to obovoid, sulcate or angled. (Named for — Scheffler.)

Species over 150 in the tropics of the Old World, about 25 in the Philippines.

1. **S. odorata** (Blanco) Merr. & Rolfe. Galamai-amo (Tag.).

A glabrous vine, reaching a height 2 to 6 m or more, Petioles longer than the leaflets. Leaflets 5 or 6, smooth and shining, coriaceous, elliptic to broadly ovate, obtuse or very shortly acuminate, 6 to 12 cm long. Panicles terminal, lax, 10 to 20 cm long. Flowers greenish, 6-merous, 2 to 3 mm in diameter. Fruits globose and fleshy when fresh, 4 to 5 mm long, prominently and sharply 6-angled when dry.

Occasionally cultivated, Singalon, fl. March–Apr.; widely distributed in the Philippines. Endemic.

107. UMBELLIFERAE (PARSLEY OR ANIS FAMILY)

Erect or prostrate often aromatic or rank scented herbs, the leaves alternate, simple and toothed or lobed, or compound, variously divided or dissected, the petioles often sheathing at the base. Flowers small, perfect or polygamous in compound or simple axillary or terminal umbels. Calyx-tube adnate to the ovary; limb none or 5-toothed. Petals 5, epigynous, imbricate or valvate. Stamens 5, epyginous. Ovary inferior, 2-celled, cells 1-ovuled. Fruit of 2, indehiscent, dorsally or laterally compressed carpels, separating by a joint or seam, the carpels with 5 primary ridges, 1 dorsal, 2 lateral, and 2 intermediate, often with additional intermediate ones.

Genera 257, species over 2,500, in all parts of the world, 8 genera and 12 to 15 species in the Philippines, mostly introduced.

In addition to the species considered below, the following are cultivated by Chinese gardeners for the Manila market: *Carum petroselinum* Benth. & Hook. f., Parsley (Sp. *perejil*); *Daucus carota L.*, Carrot (Sp. *zanahoria*); *Apium graveolens* L., Celery (Sp. *apio*); and *Coriandrum sativum* L. Coriander (Sp. *culantro*, Chinese *ongsoy*). Mature specimens of some are rarely found, and others do not attain maturity here.

1. Erect aromatic herbs with compound terminal umbels and 2- to 4-pinnate leaves, the segments filiform.. 1. *Foeniculum*
1. Prostrate herbs with simple leaves and small, axillary, simple, subcapitate umbels.
    2. Petals valvate; carpels not reticulate, with 3 ridges........ 2. *Hydrocotyle*
    2. Petals imbricate; carpels reticulate, with 5 ridges................ 3. *Centella*

1. FOENICULUM Adanson

Glabrous, tall, aromatic, biennial or perennial herbs. Leaves 2- to 4-pinnate, the segments filiform. Flowers yellow, in ample, peduncled umbels, the bracts and bracteoles none. Calyx truncate. Petals incurved, emarginate. Fruit oblong or ellipsoid, the ribs prominent subequal. Seeds somewhat dorsally compressed, the inner face somewhat concave. (The ancient Latin name.)

Species 3 or 4, Europe to western Asia, 1 widely cultivated.

* 1. F. **VULGARE** Gaertn. Haras (Tag.); Anis (Sp.); Fennel.

Erect, glabrous, often 1 m or more in height, somewhat glaucus. Leaves about 20 cm long, the segments filiform, 2 to 4 cm long. Umbels 5 to 10 cm in diameter, the rays 8 to 15, 2 to 3 cm long, longer in fruit, each with 20 to 30, pedicelled, yellow flowers. Fruit very aromatic, about 5 mm long.

Occasionally cultivated, not spontaneous, fl. Oct.–May, and probably in other months. A native of Europe, now cultivated or wild in most temperate and tropical countries.

2. HYDROCOTYLE Linnaeus

Prostrate herbs rooting at the nodes. Leaves reniform or rounded, toothed or palmately lobed, long-petioled. Umbels simple, small, axillary, sessile or pedicellate, often dense and capitate. Flowers small, the bracts small or none. Calyx-teeth none or very small. Petals entire, acute, valvate. Carpels laterally compressed, small, the secondary ridges none. (Greek "water" and "a flat cup.")

Species 50 or 60, in all tropical and some subtemperate countries, 3 or 4 in the Philippines.

1. H. ROTUNDIFOLIA Roxb.

A delicate, creeping, glabrous or nearly glabrous plant, the stems rooting at the nodes. Leaves orbicular or subreniform, thin, about 1 cm in diameter, cordate, margins somewhat crenately lobed, the lobes short, with 2 or 3 crenate teeth. Umbels very small, capitate, few-flowered, the peduncles slender, about one-half as long as the petioles. Fruits few, sometimes only 2 or 3 on a peduncle, less than 1 mm long.

In gardens, and about houses Singalon, Malate, etc., fl. Dec.–Feb., and probably in other months, certainly introduced. Widely distributed in tropical Asia.

3. CENTELLA Linnaeus

Prostrate herbs rooting at the nodes. Leaves uniform or rounded, deeply cordate, toothed, palmately nerved, long-petioled. Umbels simple, axillary, few-flowered, the flowers sessile, the bracts small, embracing the flowers. Calyx truncate. Petals 5, imbricate. Carpels laterally compressed the secondary ridges as prominent as the primary ones, the pericarp thickened. (Name of obscure origin.)

Species about 20, mostly in South Africa, a single one in the Philippines.

1. C. ASIATICA (L.) Urban. (*Hydrocotyle asiatica* L.). Taquip-cohol (Tag.).

A prostrate, sparingly pubescent or nearly glabrous, stoloniferous plant, the stems rooting at the nodes. Leaves rounded to reniform, crenate-dentate, deeply cordate, 2 to 5 cm in diameter, the petioles elongated. Peduncles in pairs or threes, less than 1 cm long, each with usually 3 sessile flowers at the apex enclosed by a pair of ovate bracts. Petals dark-purple, ovate, about 1 mm long. Carpels cylindric-compressed, about 2.5 mm long, white or green, reticulate, each with 9 subsimilar longitudinal ridges.

In open or shaded damp places, banks of rice paddies, etc., fl. Oct.–May; widely distributed in the Philippines, probably introduced. Tropical and subtropical regions generally.

108. MYRSINACEAE (ARDISIA FAMILY)

Trees or shrubs, sometimes climbing. Leaves alternate, entire or toothed, usually gland-dotted; stipules none. Flowers regular, perfect or polygamo-dioecious. Calyx inferior, 4- to 6-toothed. Corolla-tube short or none, the segments 3 to 7, usually 5, mostly contorted or imbricate, usually united below, rarely free. Stamens as many as the corolla-segments, alternate with them, free or adnate to the tube. Ovary globose or oblong, 1-celled; ovules few or many, inserted on a free central placenta. Fruit small, globose, indehiscent except in the following genus, where it is elongated and ultimately dehiscent.

Genera 33, species nearly 1,100 in all tropical and subtropical countries, 8 genera and more than 75 species in the Philippine, a single representative in our area.

1. AEGICERAS Gaertner

Small, erect, glabrous trees. Leaves obovate, coriaceous, entire, the lateral nerves obscure. Inflorescence a simple or compound, sessile, axillary or terminal umbel. Flowers 5-merous, perfect, pedicelled. Calyx-lobes imbricate. Corolla-tube short, the lobes 5. Stamens 5, inserted on the tube. Ovary oblong, narrowed into a slender style; ovules many. Fruit cylindric, curved, pointed, coriaceous, 1-seeded, at length dehiscing longitudinally, the seed similar in shape to the fruit, germinating within the pericarp. (Greek "goat" and "horn" from the shape of the fruit.)

Species 2, tropical seashores, India to Polynesia, both in the Philippines.

1. **A. corniculatum** (L.) Blanco (*A. majus* Gaertn.) Tunduc-tunducan, Pilapil (Tag.).

An erect shrub 1.5 to 6 m high. Leaves obovate, rounded or retuse, 5 to 10 cm long. Flowers numerous, white, nearly 1 cm long, in simple terminal umbels, their pedicels 1 to 2 cm long. Fruit cylindric, curved, sharply pointed, 3 to 5 cm long, about 5 m in diameter, surrounded at the base by the persistent calyx. (Fl. Filip. *pl. 38.*)

Along tidal streams, Pasay, fl. Oct.–Mar.; in similar habitats throughout the Philippines. India to China, southward to Australia.

The one other species of the genus, *A. floridum* R. & S., is not found in our area and is less common in the Philippines than *A. corniculatum;* it differs chiefly in having its flowers in a compound umbel.

109. PLUMBAGINACEAE (LEADWORT FAMILY)

Branched herbs or undershrubs with alternate, entire leaves, the flowers in terminal, often elongated spikes, the bracts and bracteoles shorter than the calyx. Flowers regular, perfect. Calyx inferior, tubular, ribbed, covered with stalked glands, the limb 5-fid. Corolla white, blue, or red, salver-shaped, the tube long, slender, the lobes spreading. Stamens 5, opposite the corolla-lobes, free. Ovary superior, 1-celled, the style slender, with 5 branches; ovule one. Fruit a membranaceous capsule, circumsciss near the base.

Genera 10, species about 300, in all parts of the world, a single introduced genus in the Philippines.

1. PLUMBAGO Linnaeus

Characters of the Family as given above. (Latin "lead.")

Species 10, of wide distribution, 3 in the Philippines, all introduced.

Flowers blue; corolla-tube 3 to 3.5 cm long........................ 1. *P. auriculata*
Flowers white or nearly so; corolla-tube 2 cm long............... 2. *P. zeylanica*
Flowers red; corolla-tube about 2. 5 cm long.............................. 3. *P. rosea*

* 1. P. AURICULATA Lam. (*P. capensis* Thunb.).

An erect, much branched, shrubby plant 1 m high or less. Leaves oblong-obovate, 1.5 to 5 cm long, 0.8 to 2 cm wide, thin, obtuse, narrowed below. Spikes terminal, about 10 cm long. Calyx greenish, 1 to 1.3 cm long, viscid-glandular. Corolla pale-blue, the tube slender, 3 to 3.5 cm long, the limb spreading, 3 cm in diameter. (Fl. Filip *pl. 27.*)

Cultivated for ornamental purposes, but not spontaneous, fl. throughout the year. Native of South Africa, now cultivated in many tropical and subtropical countries, apparently of comparatively recent introduction in the Philippines.

2. P. ZEYLANICA L.

A spreading or subscandent, herbaceous, suffrutescent plant 1 to 2 m in length, glabrous except the glandular calyces. Leaves oblong-ovate to ovate, 4 to 10 cm long, acute or acuminate, base decurrent on the short petiole, the base of the petiole dilated and clasping the stem. Spikes 5 to 25 cm in length. Calyx green, about 1 cm long, covered with stalked glands, the teeth very short. Corolla white or very pale-blue, the tube slender, about 2 cm long, the limb spreading, about 1.5 cm in diameter.

In thickets and along roadsides, Guadalupe, thoroughly naturalized, fl. Oct.–Dec.; of local occurrence in the Philippines and certainly introduced. Widely distributed in the tropics of the Old World, probably a native of India.

* 3. P. ROSEA L.

An erect or ascending, more or less branched, herbaceous or suffrutescent plant 1.5 m high or less, the stems green. Leaves ovate to oblong-ovate, 8 to 13 cm long, acute or obtuse, base very abruptly acuminate, short-petioled. Spikes 15 to 30 cm long. Calyx 8 to 10 mm long, covered with stalked glands. Corolla bright red, the tube slender, about 2.5 cm long, the limb spreading, about 3 cm in diameter. (Fl. Filip. *pl. 298, P. coccinea.*)

Occasionally cultivated, but scarcely spontaneous, fl. Oct.–Dec. A native of British India, now cultivated in many tropical countries.

110. SAPOTACEAE (GUTTAPERCHA OR CHICO FAMILY)

Tree or shrubs with milky sap, the young parts often rusty-pubescent. Leaves alternate, entire, petioled. Flowers perfect, regular, axillary, solitary or fascicled. Calyx-lobes 4 to 8, 1- or 2-seriate, imbricate, or the outer series valvate. Corolla-tube short, the lobes as many as, or 2 to 4 times as many as, the calyx-lobes. Stamens inserted on the corolla-tube, as many as the lobes and opposite them, or 2 to 3 times as many and several-seriate; staminodes often present, alternating with the stamens. Ovary superior, sessile 2- to 12-celled. Fruit fleshy, indehiscent. Seeds usually few, solitary, rather large.

Genera 50, species more than 400 in the tropics of the whole world, 7 genera and about 45 species in the Philippines.

Corolla-lobes 3 times as many as the calyx-lobes; fruit small, 2 cm long or less. .... 1. *Mimusops*

Corolla-lobes and calyx-lobes 6 each; fruit rather large, fleshy, edible. 2. *Achras*

1. MIMUSOPS Linnaeus

Trees with elliptic to obovate, usually coriaceous leaves, the lateral nerves slender, numerous. Flowers pedicelled, axillary, clustered or solitary. Calyx-segments 6 to 8, 2-seriate, the outer series valvate, the inner imbricate. Corolla-tube short, the lobes 18 to 24, 2- or 3-seriate. Stamens 6 to 16, inserted near the base of the corolla; staminodes as many as the stamens, entire, serrate, or lobed. Ovary hairy, 6- to 8-celled. Fruit ovoid, 6- to 1-seeded, the endocarp crustaceous. (Greek "ape" and "face" the application of the name not apparent.)

Species about 30, tropics of both hemispheres, 2 or 3 in the Philippines, a single introduced one in our area.

*1. M. ELENGI L. Bansalaguin (Tag.).

A tree up to 15 m in height. Leaves green, shining, elliptic, shortly blunt-acuminate, glabrous, 5 to 12 cm long, the nerves slender, numerous, spreading. Flowers axillary, solitary, in pairs or fascicled, about 1.5 cm in diameter, fragrant, the pedicels and sepals brownish-pubescent. Sepals 8, 2-seriate, ovate-lanceolate, 7 to 8 mm long. Corolla-lobes lanceolate, about 24, white, 2-seriate, the outer series with about 16 lobes, the inner with 8. Stamens 8, filaments hairy, the alternating staminodes hairy. Ovary pubescent. Fruit ovoid, about 2 cm long, 1-, rarely 2-seeded. (Fl. Filip. *pl. 105.*)

Occasionally cultivated for its fragrant flowers, introduced from India; fl. at intervals throughout the year. A closely allied form is common especially near the seashore throughout the Philippines, to which the Tagalog name *bansalaguin* properly belongs.

2. ACHRAS Linnaeus

A tree, nearly glabrous, except the flowers. Leaves petioled, somewhat crowded near the apices of the branches, coriaceous, shining, the nerves slender. Flowers axillary, pedicelled, mostly solitary in the uppermost axils. Calyx-segments 6, in 2 series. Corolla-lobes 6, imbricate. Stamens 6, affixed near the base of the corolla; staminodes 6, petal-like, alternating with the corolla-lobes. Ovary villous, 10- to 12-celled. Fruit ovoid, brown, fleshy, edible, the seeds few, rather large, black, shining. (Old Greek name for a kind of wild pear.)

A monotypic genus of Central America and the West Indies.

*1. A. SAPOTA L. Chico (Sp.-Fil.).

A much-branched tree reaching a height of 8 m. Leaves oblong to narrowly oblong-obovate, acute or shortly acuminate, base acute, 8 to 13 cm long. Flowers rusty-pubescent outside, 6 to 8 mm long. Fruit ovoid or subglobose, brown, fleshy, 3 to 5 cm long, the soft, rather sweet pulp edible. (Fl. Filip. *pl. 85.*)

Commonly cultivated for its edible fruit, fl. most of the year. Introduced from Mexico by the Spaniards at an early date and now found in all parts of the Archipelago. Tropics generally in cultivation.

111. EBENACEAE (EBONY OR CAMAGON FAMILY)

Trees or shrubs with alternate, exstipulate, entire, usually coriaceous leaves. Flowers usually dioecious, axillary, solitary, fascicled or in short cymes, the pedicels jointed under the flower. Flowers 3- to 5-merous. Calyx-lobes united below, often enlarged in fruit. Corolla-tube cylindric, usually pubescent outside, the lobes spreading or recurved. Stamens as many as the corolla-lobes, or 2 or 3 times as many, hypogynous, free or the filaments variously united, the female flowers with or without stamen-like staminodes. Ovary superior, free, sessile, 3- to 10-celled; styles 1 to 8; cells 1- or 2-ovuled. Fruit fleshy or coriaceous, globose or ovoid, indehiscent, few- to several-seeded.

Genera 7, species 325, in the tropics and some temperate countries in both hemispheres, 2 genera and about 40 species in the Philippines.

1. DIOSPYROS Linnaeus

Trees or shrubs. Flowers dioecious, rarely polygamous, axillary, 4- or 5-merous. Calyx usually deeply lobed, sometimes truncate, that of the female flowers often larger than in the males, usually more or less enlarged in fruit. Corolla tubular, salver-shaped or campanulate, shortly or deeply lobed, the lobes imbricate. Male flowers with from 4 to 60 stamens, often 16, the filaments often paired or otherwise united; anthers linear; ovary rudimentary. Female flowers with 0 to 16 staminodes; ovary 4- to 10-celled, cells 1-, rarely 2-ovuled; styles or stigmas 1 to 4. Fruit globose to ovoid, fleshy, often large, frequently supported by the much enlarged calyx. Seeds oblong to ellipsoid, usually compressed. (Greek "zeus," i. e. God, and "grain.")

Species over 200, in the tropics of both hemispheres, few in some temperate countries, about 38 in the Philippines.

Leaves glabrous; fruit green, glabrous.................................... 1. *D. ebenaster*
Leaves softly pale-pubescent beneath; fruit brown, densely pubescent.
2. *D. discolor*

*1. **D. EBENASTER** Retz. Sapote negro (Sp.-Fil.).

A glabrous tree 7 to 15 m high. Leaves oblong to elliptic-oblong, 10 to 20 cm long, obtuse. Flowers axillary, solitary, greenish-white, 1 to 1.5 cm long, the calyx-lobes broad. Fruit globose, smooth, green, becoming nearly black, edible, about 10 cm in diameter, the pulp very soft, brownish; seeds usually 4, about 2 cm long. (Fl. Filip. *pl. 372, D. nigra.*)

Rarely cultivated, flowering in March; of local occurrence in the Philippines. Introduced from Mexico at an early date, and apparently formerly much more common here than now.

2. **D. discolor** Willd. Camagon, Mabolo (Tag.); Amaga (Vis.); Talang (Pamp.).

A tree 8 to 15 m high. Leaves oblong, 10 to 25 cm long, coriaceous, acute or shortly acuminate, base usually rounded, the upper surface green, shining, glabrous, the lower surface softly pubescent with appressed, pale hairs. Flowers 4-merous. Male flowers pubescent, in short-peduncled, congested, about 7-flowered cymes. Calyx about 1 cm long. Corolla slightly larger than the calyx, nearly white, the tube cylindric, slightly contracted above, the lobes nearly as long as the tube. Stamens about 24, the filaments united in pairs. Female flowers axillary, solitary, sessile, slightly larger than the males. Staminodes usually 4. Styles 4. Fruit large, globose, fleshy, up 10 cm in diameter, edible, densely covered with brown hairs. (Fl. Filip. *pl. 109.*)

Common, fl. Feb.–Apr.; widely distributed in the Philippines, indigenous; cultivated in other tropical countries.

112. OLEACEAE (OLIVE OR SAMPAGUITA FAMILY)

Erect or climbing shrubs or trees, the leaves opposite, rarely alternate, pinnate, 3-foliolate, or reduced to a single leaflet with a usually jointed petiole. Inflorescence terminal or axillary, in cymes or panicles, or in reduced racemes or clusters. Flowers perfect, regular. Calyx free, usually 4- or 5-toothed, teeth sometimes more numerous, or truncate. Corolla with a short or long tube, the lobes 4 to 9, spreading, sometimes free nearly or quite to the base. Stamens 2, included, attached to the corolla. Ovary superior, 2-celled, ovules 1 to 3. Fruit fleshy or capsular, globose or ovoid, sometimes winged. Seeds 1 or 2 in each cell.

Genera 21, species about 400, in most tropical and temperate regions, 4 genera and about 30 species in the Philippines.

1. JASMINUM Linnaeus

Erect or scandent shrubs, glabrous or pubescent. Leaves opposite or alternate, simple, 3-foliolate, or odd-pinnate, the petiole usually jointed. Inflorescence cymose, dichotomous or trichotomous, rarely simple or the flowers solitary. Calyx 4- to 9-fid, the tube usually funnel-shaped, the teeth, linear, sometimes very short or nearly wanting. Corolla salver-shaped, the tube slender, long or short, the lobes 4 to 9, spreading. Stamens 2, included. Ovary 2-celled. Fruit fleshy, often in pairs, or by suppression of one of the carpels simple. (From the Arabian name.)

Species 100 or more, warm and tropical part of the Old World, about 15 in the Philippines.

1. Leaves pinnate .... 1. *J. grandiflorum*
1. Leaves simple.
    2. Calyx-teeth much shorter than the tube .... 2. *J. aculeatum*
    2. Calyx-teeth much longer than the tube.
        3. Cymes few-flowered; corolla double; leaves acute or rounded at the base .... 3. *J. sambac*
        3. Cymes densely many-flowered; corolla single; leaves cordate at the base .... 4. *J. multiflorum*

*** 1. J. GRANDIFLORUM L.**

A glabrous woody vine reaching a length of 8 m, the branches often pendulous. Leaves odd-pinnate, 6 to 9 cm long. Leaflets about 9, the lower ones shortly stalked, the upper ones sessile, often somewhat fused, ovate, sharply pointed, 1 to 2 cm long. Inflorescence terminal, cymose, few-flowered. Calyx-teeth very slender, about 7 mm long. Corolla white, the tube slender, nearly 2 cm long, the lobes spreading, 1.5 cm long.

Occasionally cultivated, but not spontaneous, fl. most of the year. A native of India.

2. J. aculeatum (Blanco) Walp.

A somewhat scandent glabrous shrub 2 to 5 m high. Leaves simple, ovate to oblong-ovate, acuminate, base usually rounded, 4 to 7 cm long, 2 to 3.5 cm wide, shining; petioles jointed, the persistent bases simulating short blunt spines. Inflorescence axillary and terminating the short lateral branches, few-flowered, often with only from 1 to 3 flowers. Calyx green, with 4 to 6 short teeth. Corolla white, the tube slender, 1.5 to 2.5 cm long, the lobes 6 to 8, narrowly lanceolate, acuminate, spreading, about 1.5 cm long. Fruit globose or ovoid, glabrous, fleshy, black, about 8 mm in diameter. (Fl. Filip. *pl. 445, J. marianum.*)

In thickets, San Pedro Macati, Masambong, etc., fl. most of the year; widely distributed in the Philippines. Endemic.

*** 3. J. SAMBAC (L.) Ait.** Campopot (Tag.); Sampaguita (Sp.-Fil.); Jasmine.

A spreading or subscandent, glabrous shrub usually less than 2 m high. Leaves ovate, obtuse, acute, or shortly acuminate, glossy, 6 to 12 cm long, short-petioled. Inflorescence axillary, solitary, peduncled, few-flowered, racemose or cymose. Flowers white, very fragrant. Calyx-teeth 8 to 10, very slender, 5 to 8 mm long, mostly longer than the tube. Corolla-tube slender, 1 to 1.5 cm long, the limb usually double, 1.5 to 2 cm in diameter. (Fl. Filip. *pl. 6.*)

Frequent in cultivation, but not spontaneous, fl. all the year. A native of India, now much cultivated in all tropical countries.

4. J. MULTIFLORUM (Burm.) Roth. Sampaguita de China (Sp.-Fil.); Lagitic (Tag.).

An erect or somewhat climbing shrub 2 to 5 m high, more or less pubescent. Leaves ovate, 4 to 9 cm long, base cordate, apex acuminate. Cymes terminal, crowded, densely many-flowered, 7 to 10 cm in diameter. Flowers white, fragrant. Calyx pubescent, the lobes linear, 5 to 6 mm long. Corolla-tube about 1.5 cm long, the lobes 7 to 9, spreading, oblong, 1.5 to 1.8 long.

Cultivated for ornamental purposes, fl. most of the year. A native of India; introduced in the Philippines and cultivated only.

113. SALVADORACEAE (SALVADORA FAMILY)

Scandent or rambling shrubs with opposite entire leaves and slender axillary spines. Flowers small, dioecious, axillary, sessile, or in small axillary or terminal panicles, clusters, or umbels. Calyx free, campanulate, 4-fid or irregularly 2- to 4-lobed. Petals 4, oblong, imbricate. Stamens 4, alternate with the petals, hypogynous. Ovary superior, 2-celled; stigma nearly sessile, large, 2-fid. Ovules 2 or 1 in each cell. Fruit a small globose or ovoid, 3- to 1-seeded berry.

Genera 3, species 6 or 7, tropical and subtropical Asia, Africa, and Malaya, a single genus and species in the Philippines.

AZIMA Lamarck

Characters of the Family as given above.

Species 2 or 3, tropical Asia to Malaya and South Africa, in the Philippines.

1. **A. sarmentosa** (Bl.) Benth.

A scandent or rambling, glabrous shrub 2 to 4 m in length, rank-smelling when crushed, the branches slender, terete, green. Leaves shining, ovate to elliptic-ovate, entire, acute, apiculate, 5 to 8 cm long, short-petioled, the spines usually 2 or 4 at each node, slender, sharp, 5 to 10 mm long. Panicles terminal and axillary, 4 to 15 cm long, the bracts small. Flowers greenish, about 3 mm long. Fruit fleshy green or nearly white, subglobose, about 6 mm in diameter, with from 1 to 3 seeds.

In hedges and thickets, Malabon, Pasay, Maypajo, etc., fl. Feb.–Mar.; in the Philippines of local occurrence, and possibly an introduced plant only, but if so, naturalized. India to Burma, and Malaya.

114. LOGANIACEAE (STRYCHNINE OR IGASUD FAMILY)

Herbs, shrubs, or trees, sometimes climbing, with opposite, simple, entire or slightly toothed leaves, the stipules various or none. Flowers regular, in simple or compound, terminal or axillary cymes, sometimes subspicate, or even solitary. Calyx 4- or 5-lobed, inferior. Corolla 4- or 5-lobed, small or large. Stamens 4 or 5, inserted on the corolla-tube, alternate with the lobes. Ovary superior, free, 2-celled; style simple; ovules one to many in each cell. Fruit capsular, septicidal, or fleshy and indehescent, 1- to many-seeded.

Genera 32, species about 550, tropical and subtropical countries of both hemispheres, 7 genera and 20 species in the Philippines, a single representative in our area.

1. BUDDLEIA Linnaeus

Erect branched shrubs, with opposite, lanceolate, finely toothed leaves, a stipular line between the petioles. Flowers small, the cymes small, in dense, spike-like, elongated branches of the terminal and axillary, paniculate inflorescence. Calyx 4-lobed. Corolla urn-shaped, 4-lobed. Stamens 4, inserted on the tube. Capsule small, 2-valved. Seeds numerous, oblong or fusiform.

Species about 70, in most tropical and subtropical countries, a single one in the Philippines.

1. **B. asiatica** Lour. Talicnono, Malasambong (Tag.).

An erect branched shrub 1 to 2 m high, the branches and lower surfaces of the leaves densely grayish- or brownish-pubescent. Leaves lanceolate, acuminate, toothed, 5 to 15 cm long. Panicles ample, the spike-like branches up to 15 cm long, 5 to 8 mm in diameter. Flowers white, 3.5 to 4 mm long, pubescent. Capsules reflexed, oblong, about as long as the flowers.

In thickets, Guadalupe, San Francisco del Monte, etc., fl. Jan.–Feb.; widely distributed in the Philippines. India to China and Malaya.

115. GENTIANACEAE (GENTIAN FAMILY)

Erect or scandent herbs, usually glabrous. Leaves opposite, entire. Flowers mostly cymose, rarely solitary, regular, or slightly irregular in *Canscora*. Calyx inferior, 4- or 5-lobed. Corolla funnel-shaped or rotate, 4- or 5-lobed. Stamens as many as the corolla-lobes and alternate with them, inserted on the tube, or in *Canscora* unequal or suppressed. Ovary superior, 1-celled. Capsule thin, rarely somewhat fleshy. Seeds numerous, small.

Genera about 64, species more than 550, in all parts of the world, 9 genera and 12 species in the Philippines, a single genus in our area.

1. CANSCORA Lamarck

Annual, erect, slender, dichotomously branched, glabrous herbs. Leaves opposite, sessile. Flowers in dichotomously branched, lax, leafy cymes. Calyx tubular, 4-toothed. Corolla-tube cylindric, as long as the calyx, the lobes 4, more or less unequal. Stamens 4 near the summit of the corolla-tube, 1 or 2 larger and perfect, 2 or 3 with shorter filaments, barren, or sometimes nearly wanting. Ovary 1-celled. Capsule 2-valved. (A Malabar name.)

Species 14, chiefly Indian, few in Africa, Malaya and Australia, a single one in the Philippines.

1. **C. diffusa** (Willd.) R. Br. Cobamba, Malengal (Tag.).

A slender, erect, glabrous annual 10 to 50 cm high, the stems 4-angled, much branched upward. Lower leaves lanceolate, 3-nerved, 4 to 7 cm long, narrowed at both ends, the upper ones shorter and passing into bracts. Cymes diffuse, the bracts sessile, ovate, foliaceous, up to 1 cm long. Flowers slenderly peduncled, about 1 cm long. Calyx green, the teeth linear-lanceolate. Corolla white or very pale-pink, two lobes somewhat larger than the other two. Capsule oblong, as long as the calyx.

On ledges along streams, Masambong, etc., fl. Oct.–Mar.; widely distributed in the Philippines. Tropical Africa and Asia, through Malaya to Australia.

116. APOCYNACEAE (ALSTONIA OR DITA FAMILY)

Erect or twining vines, or trees, rarely undershrubs. Leaves opposite or whorled, sometimes alternate, simple, entire. Flowers in terminal or axillary cymes, perfect, regular. Calyx 5- rarely 4-lobed, often glandular within. Corolla rotate or salver-shaped, the lobes 5, rarely 4, spreading, imbricate and twisted in bud, rarely valvate, the throat sometimes appendaged. Stamens 5, rarely 4, on the tube or throat of the corolla, included or exserted, the anthers conniving, often adhering to the stigma. Disk various or none. Ovary 1-celled, 2-celled, or of 2 free or more or less united carpels, often united only by the styles; ovules few to many. Fruit a dry or fleshy drupe or berry, or a dry or fleshy follicle, solitary or in pairs and more or less united at the base. Seeds various, often winged or with a terminal coma of long soft hairs. Juice milky.

Genera 162, species about 1,300, in all tropical countries, few in temperate regions, 32 genera and about 50 species in the Philippines.

1. Anthers included or exserted, free from the stigma.
  2. Leaves alternate.
    3. Leaves broad; trees with nearly white flowers.
      4. Ovules many in each cell .... 1. *Plumiera*
      4. Ovules 4 in each cell .... 2. *Cerbera*
    3. Leaves linear; shrubs with large yellow flowers .... 3. *Thevetia*
  2. Leaves opposite.
    3. Undershrubs with showy pink or white flowers, and small dry follicles .... 4. *Lochnera*
    3. Shrubs with small or medium white flowers and red, more or less fleshy, usually longitudinally ridged or keeled follicles. 5. *Tabernaemontana*
  2. Leaves whorled.
    3. Trees with small white flowers and very long slender follicles. 6. *Alstonia*
    3. Shrubs or vines with large yellow flowers .... 7. *Allamanda*
1. Anthers surrounding and adnate to the stigma.
  2. Corolla-throat with 5 to 10 entire or fimbriate scales or appendages.
    3. Anthers exserted; trees .... 8. *Wrightia*
    3. Anthers included.
      4. Shrubs with narrow, densely nerved leaves, the corolla-lobes not elongated; cultivated only .... 9. *Nerium*
      4. Vines with broad leaves, the corolla-lobes produced into very long, pendulous tails .... 10. *Strophanthus*
  2. Corolla-throat naked.
    3. Anthers exserted, their filaments spirally twisted .... 11. *Parsonsia*
    3. Anthers included or half-exserted, their filaments not twisted.

4. Flowers medium, the corolla-lobes spreading, nearly straight, 1.5 to 2 cm long........ 12. *Aganosma*
4. Flowers small, the corolla-lobes short, their tips deflexed.
13. *Ichnocarpus*

1. PLUMIERA Linnaeus

Erect glabrous trees with very stout branches. Leaves scattered, elongated. Flowers large, in terminal cymes. Calyx small, 5-lobed, the lobes obtuse. Corolla funnel-shaped, the lobes strongly overlapping. Stamens inserted near the base of the tube; anthers obtuse, rounded at the base, free from the stigma. Carpels 2, distinct; ovules many. Fruit a linear-oblong or ellipsoid follicle. (In honor of C. Plumier, an early French botanist.)

Species about 40, all of tropical America, the following now cultivated in tropical countries.

***1. P. ACUTIFOLIA** Poir. Calachuchi (Sp.-Fil.); Temple Flower, Graveyard Flower, Frangipangi.

A tree 3 to 7 m high, the branchlets swollen, leafy at their tips. Leaves oblong, narrowed at both ends, 20 to 40 cm long. Flowers numerous, very fragrant, white and pinkish outside, yellow within, 5 to 6 cm long. (Fl. Filip. *pl. 89.*)

Commonly cultivated for the fragrant flowers, but not spontaneous, fl. all the year; cultivated in all tropical countries, a native of tropical America.

2. CERBERA Linnaeus

Glabrous trees with alternate leaves. Flowers rather large, in terminal cymes. Calyx 5-parted, not glandular. Corolla funnel-shaped or salver-shaped, the tube slender, the lobes broad. Stamens included; anthers lanceolate, cells rounded at the base, free from the stigma. Disk none. Carpels 2, distinct; ovules 4 in each carpel. Fruit large, ovoid or ellipsoid, the pericarp thick, fibrous and woody. (After the dog Cerberus of Greek mythology.)

A small genus of 5 or 6 species in the littoral districts from Madagascar to India and Malaya, at least 2 in the Philippines.

1. C. odollam Gaertn. Barabay, Lipata (Tag.).

A tree 4 to 6 m high, the branches stout. Leaves lanceolate to oblong-lanceolate, narrowed at both ends, acuminate, about 20 cm long, shining, the nerves slender. Cymes often as long as the leaves, peduncled. Calyx-tube short, the lobes spreading, pale-green, lanceolate, acuminate, about 2 cm long. Corolla-tube slender, greenish-white, enlarged above, about 4 cm long, the 5-lobed limb white with a purple center, spreading, about 5 cm in diameter. Fruit smooth, ellipsoid or ovoid, about 6 cm long.

Occasional along the Pasay beach, fl. all the year; throughout the Philippines along the seashore. India to China, Malaya, Australia, and Polynesia.

3. THEVETIA Linnaeus

Shrubs with elongated branches and numerous, entire, narrow, alternate leaves. Flowers large, yellow, solitary or in few-flowered cymes. Calyx-lobes 5, lanceolate, somewhat spreading. Corolla funnel-shaped, the lower part of the tube cylindric, dilated above, the lobes 5, longer than the tube, somewhat inequilateral. Stamens adnate to the bearded throat of the corolla-tube, the anthers free from the stigma. Disk lobed. Ovary 2-lobed 2-celled, the cells 2-ovuled. Drupe broader than long, the endocarp hard, 2-celled, 2- to 4-seeded. (In honor of A. Thevet, a French priest who worked in Brazil.)

Species about 7 in tropical America, some now cultivated in other warm countries.

T. peruviana (Pers.) Merr.

* 1.(T. NERIIFOLIA Juss.) Campanilla (Sp.-Fil.).

An erect, branched, glabrous shrub 2 to 5 m high, with copious milky sap. Leaves linear, 10 to 15 cm long, 7 to 10 mm wide, sessile, shining. Calyx-teeth acuminate 7 to 9 mm long, green. Corolla 7 cm long about 5 cm broad, yellow. Drupe subglobose, glabrous, green, shining, 3 to 4 cm in diameter (Fl. Filip. *pl. 45.*)

Cultivated only, fl. all the year; an ornamental shrub introduced from tropical America.

4. LOCHNERA Reichenbach

Low undershrubs or shrubby plants with erect stems. Leaves opposite, entire. Flowers axillary, solitary or in pairs. Calyx-lobes 5, slender. Corolla salver-shaped; the tube slender, the limb of 5, broad, spreading lobes. Stamens included, the anthers free from the stigma. Disk of 2 large glands alternating with the carpels. Carpels 2, distinct, united by the styles. Follicles 2, several-seeded, erect or spreading. Seeds not appendaged. (In honor of M. F. Lochner, an early German botanist.)

Species 3, tropical America, India, and Madagascar, a single introduced one in the Philippines.

1. L. ROSEA (L.) Reichb. (*Vinca rosea* L.). Chichirica (Sp.-Fil.).

An erect, simple or slightly branched plant, 30 to 50 cm high, glabrous or slightly pubescent, the stems woody at least below. Leaves oblong, 4 to 7 cm long, apex usually rounded and apiculate, base often inequilateral. Calyx-lobes subulate, about 4 mm long, green. Corolla-tube slender, 2.5 to 3 cm long, pale-green, the limb spreading, 3.5 to 5.5 cm in diameter, white, pink, red, or white with a red or pink center, the lobes obliquely obovate, 1.7 to 2.5 cm wide. Follicles cylindric, pubescent, 2 to 3 cm long. (Fl. Filip. *pl. 42.*)

Frequently cultivated, fl. all the year; all tropical countries, cultivated or wild. A native of tropical America, now naturalized and widely distributed in the Philippines.

5. TABERNAEMONTANA Linnaeus

Erect shrubs or small trees, glabrous or somewhat pubescent. Leaves opposite, one of each pair often smaller than the other. Flowers white, 5-merous, in few-flowered axillary cymes, in pairs, or solitary. Calyx 5-lobed or -parted, usually glandular within. Corolla salver-shaped, the tube cylindric, somewhat inflated at or above the middle, the lobes spreading, often falcate. Stamens inserted at or above the middle of the tube, included, the anthers free from the stigma. Carpels 2, free; ovules many in each carpel. Fruit of 2, somewhat fleshy, usually red, oblong to subglobose, smooth or longitudinally ribbed, few- to many-seeded follicles; seeds borne in the pulp, grooved down one side. (In honor of J. B. Tabernaemontanus, an early German physician and botanist.)

Species more than 100 in all tropical regions, about 10 in the Philippines.

1. Quite glabrous.
   2. Flowers double; cultivated only .... 1. *T. divaricata*
   2. Flowers single.
      3. Follicles oblong, prominently longitudinally ridged or keeled. 2. *T. pandacaqui*
      3. Follicles, subglobose, not or obscurely ridged .... 3. *T. subglobosa*
1. Leaves uniformly puberulent .... 4. *T. puberula*

* 1. T. DIVARICATA (L.) R. Br. (*T. coronaria* R. Br.).

An erect, glabrous, much-branched shrub 2 to 3 m high, with abundant milky sap. Leaves opposite, those of each pair unequal, glossy, elliptic-ovate to elliptic-oblong, acuminate, 6 to 15 cm long. Peduncles axillary, solitary or in pairs, short, few-flowered. Flowers usually double, white, fragrant, the corolla-tube about 2 cm long, the limb spreading, about 5 cm in diameter, the center yellow.

Occasional in cultivation, fl. more or less all the year. Original home unknown, but now cultivated in most tropical countries; of recent introduction in the Philippines.

2. **T. pandacaqui** Poir. Pandacaqui (Tag.).

An erect, branched, glabrous shrub 1 to 4 m high. Leaves elliptic-lanceolate to oblong-elliptic, narrowed at both ends, acuminate, 5 to 12 cm long, green, shining, short-petioled. Cymes axillary and terminal, peduncled, rather few-flowered. Calyx green, ovoid, short. Corolla white, the tube slender, about 1.7 cm long, tinged with green, slightly enlarged upward, the limb 2 to 2.5 cm in diameter, of 5, spreading, falcate, lanceolate lobes. Follicles oblong, usually acuminate, longitudinally ridged or keeled, 2 to 4 cm long, red or yellowish-red. (Fl. Filip. *p. 41.*)

In thickets etc., common, fl. all the year; widely distributed in the Philippines. Endemic.

3. **T. subglobosa** Merr. Pandacaqui (Tag.).

A glabrous shrub 2 to 5 m high. Leaves oblong, 9 to 18 cm long, shortly blunt-acuminate. Cymes in the upper axils, 5 cm long or less, few-flowered. Flowers white, the tube about 1.4 cm. long, the lobes shorter. Follicles in pairs, ovoid to subglobose, red, fleshy, 4 cm long or less, not or but obscurely keeled. (Fl. Filip. *pl. 283, T. globosa.*)

In thickets, Malate, rare, fl. in June and probably in other months; widely distributed in the Philippines. Endemic.

4. **T. puberula** Merr. Pandacaqui (Tag.).

A shrub about 2 m high. Leaves oblong to elliptic-ovate, acuminate, puberulent, 4 to 10 cm long. Cymes axillary, few-flowered. Flowers slender, white, about 1 cm long. Follicles red, ovoid to oblong, somewhat curved, ridged, acuminate, 1 to 2 cm long.

In dry thickets near Fort McKinley, fl. May–June; known only from Rizal Province, Luzon.

6. ALSTONIA R. Brown

Trees with opposite or whorled leaves. Inflorescence of terminal or subterminal corymbose cymes. Calyx short, 5-lobed. Corolla salver-shaped, tube cylindric, the throat naked, annulate, or with reflexed hairs, the lobes short. Stamens inserted near the top of the tube, included, the anthers free from the stigma. Ovary of 2 distinct carpels; style filiform; ovules very numerous, in many series. Fruit of 2, long, slender follicles. Seeds linear, flattened, ciliate at both ends.

Species about 35, tropical Africa and Asia to Australia and Polynesia, about 4 in the Philippines. (In honor of Dr. Alston, an English physician.)

1. **A. scholaris** (L.) R. Br. Dita (Tag.).

A glabrous tree 6 to 20 m high with abundant milky sap, the branches whorled. Leaves verticillate, 4 to 7 in a whorl, coriaceous, 8 to 20 cm long, oblong-obovate, rounded, base acute, green and shining on the upper surface, the lower surface white or grayish; nerves very numerous, parallel, horizontal. Cymes peduncled, often umbellately branched, the whole inflorescence about 10 cm long. Flowers crowded, numerous, somewhat pubescent, white, about 1 cm long, throat villous. Follicles pendulous, slender, cylindric, 20 to 40 cm long, 4 to 5 mm in diameter. Seeds about 4 mm long, the brown ciliate hairs on the ends longer than the seeds. (Fl. Filip. *pl. 113.*)

Old Botanic Garden, fl. April; widely distributed in the Philippines. Africa, tropical Asia, Malaya, and Australia.

7. ALLAMANDA Linnaeus

Erect or somewhat climbing shrubs, glabrous or pubescent. Leaves verticillate or opposite, penninerved, usually glandular in the axils of the nerves on the lower surface. Flowers large, yellow, at the ends of the branches in few-flowered axillary racemes. Calyx 5-parted, the segments lanceolate, exterior ones usually the larger. Corolla broadly funnel-shaped, the tube narrow at the base, abruptly enlarged and campanulate above, the lobes broad. Stamens inserted in the throat, the anthers free from the stigma. Disk thick, fleshy. Ovary entire, 1-celled with 2 parietal placentae. Fruit an ovate compressed capsule. (In honor of Dr. Allamand, a Dutch physician.)

Species about 12 in tropical America, some now cultivated in all warm countries.

Corolla about 7 cm long	1. *A. cathartica*
Corolla about 12 cm long	2. *A. hendersonii*

1. A. CATHARTICA L. Campanilla (Sp.-Fil.).

A glabrous or somewhat pubescent, erect or subscandent shrub, 2 to 4 m high. Leaves in whorls of three or four, or the uppermost ones scattered, lanceolate or oblanceolate, acuminate, sessile, about 12 cm long, 2.5 to 4 cm wide, the upper surface shining. Flowers shortly pedicelled, yellow, calyx-teeth green, somewhat spreading, lanceolate, acuminate, 1 to 1.5 cm long. Corolla about 7 cm long, the slender part of the tube 3 cm long, then inflated and about 2 cm in diameter, the lobes ovate or oblong-ovate, spreading, rounded, about 2 cm long. (Fl. Filip. *pl. 30.*)

A commonly cultivated shrub, fl. all the year, apparently subspontaneous in some parts of the Philippines. A native of tropical America, now widely distributed in the tropics.

* 2. A. HENDERSONII Bull.

A glabrous shrub 2 to 4 m high, sometimes subscandent. Leaves in whorls of fours, oblong-obovate to elliptic-oblong, 10 to 14 cm long, sharply acuminate. Corolla yellow, about 12 cm long, the tube slender below, inflated above, the limb about 8 cm wide.

Cultivated for ornamental purposes, fl. all the year; a native of tropical America, of recent introduction here.

8. WRIGHTIA R. Brown

Pubescent or glabrous trees with abundant milky sap. Leaves ovate to oblong, opposite. Flowers of medium size, in terminal and axillary cymes. Calyx short, 5-parted, with glands or scales inside. Corolla salver-shaped, the tube cylindric, rather short, the throat with 1 or 2 series of usually fimbriate scales. Stamens inserted near the top of the tube, exserted, surrounding and adhering to the stigma. Ovary of 2, free or connate, many-ovuled carpels; style filiform. Follicles stout, connate or distinct. Seeds linear, coma deciduous. (In honor of W. Wright, an English physician.)

Species about 12, tropical Africa and Asia to Australia, 3 in the Philippines.

1. **W. laniti** (Blanco) Merr. (W. ovata A. DC.) Laniti (Tag.).

A tree 5 to 12 m high with firm white wood. Leaves ovate to oblong-ovate, acuminate, 6 to 12 cm long, pubescent, distichous. Cymes 5 to 8 cm long. Corolla pink and white. The tube short, the lobes ovate or oblong, about 1.5 cm long, the scales alternating with the lobes. Stamens exserted. Follicles cylindric, pointed, 10 to 30 cm long, 1 to 1.5 cm in diameter; coma of the seeds copious, white. (Fl. Filip *pl. 40.*)

In thickets, Pasay to Masambong and Caloocan, fl. May–Aug.; widely distributed in the Philippines. Endemic.

9. NERIUM Linnaeus

Erect, branched, glabrous shrubs, the leaves narrow, coriaceous, whorled or rarely opposite, densely nerved. Flowers large, in terminal, racemose cymes. Calyx 5-parted. Corolla funnel-shaped, the tube cylindric, enlarged above, the throat with a row of appendages cleft into linear segments, the lobes broad, spreading. Stamens inserted at the inflation of the tube, the anthers included, hairy, surrounding and adhering to the stigma. Ovary of 2 distinct carpels, many-ovuled. Follicles elongated, cylindric. Seeds villous, with a terminal coma. (The ancient Greek name of the oleander.)

Species 2 or 3, Mediterranean region to Japan, a single introduced one in the Philippines.

* 1. N. INDICUM Mill. (*N. odorum* Soland.). Adelfa (Sp.-Fil.); Oleander.

An erect shrub 1.5 to 3 m high. Leaves mostly in whorls of 3 or 4, linear-lanceolate, acuminate, 11 to 15 cm long, the numerous nerves horizontal. Flowers 4 to 5 cm in diameter, white, pink, or red, fragrant. Follicles long. (Fl. Filip. *pl. 37.*)

Cultivated but not spontaneous, fl. all the year; in most towns in the Philippines in cultivation. Affghanistan to India and Japan; introduced in the Philippines at an early date.

10. STROPHANTHUS DeCandolle

Stout woody vines, shrubs, or trees. Leaves opposite. Flowers large, in terminal cymes. Calyx 5-parted, glandular within. Corolla funnel-shaped, the throat broader and campanulate, with 5 cleft, or 10 free appendages, the lobes 5, produced into very long, slender, pendulous tails. Stamens included, the anthers surrounding and adhering to the stigma, their tips filiform. Disk none. Carpels 2, free, many-ovuled. Follicles large, woody, oblong, seeds beaked, with a feathery tail or sessile coma of long, soft, white hairs. (Greek "a turning" and "flower.")

Species 35, tropical Asia, Africa, and Malaya, 1 or 2 in the Philippines.

1. **S. cumingii** A. DC. (*S. erectus* Merr.).

A stout, high-climbing woody vine or at first erect and shrub-like, glabrous. Leaves elliptic-ovate to oblong-ovate, 8 to 13 cm long, shortly acuminate. Cymes terminal, glabrous, few-flowered. Calyx-lobes slender, 7 to 9 mm long. Corolla-tube white, 2 cm long, the lobes 8 mm wide at the base, attenuate into long, slender, drooping tips about 13 cm long, the appendages cleft, about 1 cm long. Apical awns of the anthers up to 15 mm in length. Follicles woody, oblong-ovoid, about 16 cm long and 7 cm in diameter.

Rare in cultivation, Singalon, fl. most of the year; widely distributed in the Philippines. Endemic.

11. PARSONSIA R. Brown

Slender or stout, woody, climbing vines. Leaves opposite. Flowers small, in axillary or terminal corymbose cymes. Calyx 5-partite, within naked, glandular, or with 5 scales. Corolla salver-shaped, the tube short, cylindric or globose, the throat naked. Stamens inserted in the corolla-tube; filaments twisted; anthers half-exserted, surrounding and adhering to the stigma. Disk of 5 lobes or scales. Ovary 2-celled. Fruit of 2, nearly free, lanceolate-cylindric follicles. Seeds linear to oblong, the tip narrowed and with a coma of soft silky hairs at the summit. (In honor of J. Parsons, an English physician.)

Species about 12, tropical Asia to Australia and New Zealand, 2 in the Philippines.

1. **P. cumingiana** A. DC.

A glabrous, scandent, woody vine, reaching a height of about 5 m. Leaves elliptic to elliptic-ovate, shortly acuminate, 5 to 8 cm long. Cymes axillary, trichotomous, less than one-half as long as the leaves. Flowers yellowish-green, 7 mm long. Follicles lanceolate, 7 to 9 cm long, about 1 cm in diameter. Seeds about 1 cm long, the coma copious, soft, 1.5 cm long.

In thickets near the beach, Pasay, fl. June–Sept.; rather widely distributed in Luzon. Endemic.

12. AGANOSMA G. Don

Climbing shrubs, glabrous or pubescent. Leaves oblong, acuminate, opposite. Cymes terminal and axillary, small or medium in size. Flowers white. Sepals acuminate. Corolla salver-shaped, the tube short, the lobes lanceolate, much longer than the tube. Stamens included, the anthers meeting over the stigma and adnate to it. Disk 5-lobed. Ovary of 2, distinct, many-ovuled carpels. Follicles cylindric, elongated, straight or curved, linear. Seeds ovate or oblong. (Greek "desirable.")

Species about 5, India to Malaya, 2 in the Philippines.

1. **A. acuminata** (Roxb.) G. Don (*A. marginata* G. Don).

A woody vine reaching a height of 10 m or less, slightly pubescent or nearly glabrous. Leaves oblong, acuminate, base acute or obtuse, 6 to 12 cm long, the nerves prominent beneath, joined with the distinct, looped, marginal nerve. Inflorescence axillary, peduncled, cymose, 6 to 10 cm long. Flowers white, fragrant. Calyx-lobes lanceolate or oblong-lanceolate, pointed, about 1 cm long. Corolla white, the tube about 7 mm long, the lobes spreading, linear, 1.5 to 2 cm long. Follicles very long, slender, pendulous, cylindric, up to 60 cm in length. (Fl. Filip. *pl. 428, Echites procumbens.*)

In thickets, Masambong, fl. June; occasional in the Philippines. India to Malaya.

13. ICHNOCARPUS R. Brown

Climbing shrubs with ovate, opposite leaves. Flowers numerous, small, in elongated, terminal and axillary cymes. Calyx 5-cleft. Corolla salver-shaped, throat contracted or villous, the lobes narrowed, obtuse, the upper half deflexed in bud. Stamens inserted at or below the middle of the tube, the anthers surrounding and adhering to the stigma. Ovary of 2 distinct carpels, hairy, many-ovuled, exserted from the disk; style short. Follicles slender, spreading, cylindric or somewhat compressed. Seeds narrowed above, the coma deciduous (Greek "vestige" and "fruit," in allusion to the slender carpels.)

Species 5 or 6, India to Australia, 1 or 2 in the Philippines.

1. **I. ovatifolius** A. DC. Hinguio (Tag.).

A woody vine 4 m or more in length, glabrous or nearly so. Leaves ovate to oblong-ovate, 5 to 14 cm long, acuminate, base rounded or acute. Cymes terminal and axillary, many-flowered, the entire inflorescence 5 to 20 cm in length. Flowers white, rather crowded, about 6 mm long. Follicles slender, 5 to 18 cm long, about 3 mm in diameter, densely brown-pubescent. (Fl. Filip. *pl. 97, I. frutescens.*)

In thickets, occasional, fl. June–Aug.; widely distributed in the Philippines. India to Malaya.

117. ASCLEPIADACEAE (MILKWEED FAMILY)

Herbs or shrubs, usually twining, with milky juice, the leaves simple, entire, opposite, rarely alternate or wanting, exstipulate. Inflorescence various, usually of axillary umbel-like cymes. Flowers regular, perfect, 5-merous. Calyx-lobes imbricate. Corolla-lobes valvate or imbricate, the tube or its throat with a ring of hairs, scales, or processes. Stamens at the base of the corolla, the filaments united into a short fleshy tube which encloses the pistil, and usually bearing a series of scales or processes forming a crown; anthers crowing the column, connate or free, adnate to the stigma, the tips often with an inflexed membrane, the pollen forming 1 or 2 granular or waxy masses in each anther-cell. Ovary superior, of 2 distinct carpels, enclosed within the staminal column; styles 2, united in the stigma; ovules few to many. Fruit of 2 follicles, the seeds compressed, usually flat, winged, and crowned with a terminal coma of long, soft, white hairs.

Genera 257, species about 2,000, in all parts of the world, chiefly tropical, 21 genera and about 100 species in the Philippines.

1. Filaments free, short; pollen of numerous loose granules, each granule formed of 3 or 4 pollen-grains.
    2. Glabrous vines with large purple flowers; cultivated only. 1. *Cryptostegia*
    2. Pubescent vines with minute flowers.................................. 2. *Streptocaulon*

1. Filaments united; pollen-masses waxy, 1 or 2 in each anther-cell.
2. Pollen-masses pendulous.
3. Erect herbs with showy red and orange-yellow flowers.... 3. *Asclepias*
3. Twining slender vines with small flowers................ 4. *Ischnostemma*
2. Pollen-masses erect.
3. Corolla-lobes imbricate.
4. Corona borne on the corolla-tube.................................... 5. *Gymnema*
4. Corona borne on the staminal-tube.
5. Corolla rotate or somewhat companulate................ 6. *Tylophora*
5. Corolla somewhat salver-shaped, the tube swollen below. 7. *Telosma*
3. Corolla-lobes valvate; mostly epiphytic vines with abundant milky juice, and thick, fleshy leaves.
4. Staminal-column not appendaged on the back.... 8. *Conchophyllum*
4. Staminal-column appendaged on the back.
5. Corolla rotate; corona stellate, the lower lobes erect or spreading, the upper ones beaked.. 9. *Hoya*
5. Corolla urceolate or cylindric; corona-processes vary thin. 10. *Dischidia*

11. CRYPTOSTEGIA R. Brown.

Climbing woody vines with opposite shining leaves. Flowers large, showy, in few-flowered, terminal, dichotomous or trichotomous cymes. Sepals lanceolate. Corolla funnel-shaped, the tube short, the limb campanulate, with 5 broad lobes. Coronal-scales at the base of the throat, subulate, entire or 2-cleft. Filaments short; anthers adnate to the stigma, acute; pollen-masses in pairs in each cell. Follicles thick, divaricate, hard, 3-winged, furrowed between the wings. Seeds comose. (Greek "conceal" and "cover.")

Species 2, tropical Asia and Africa, 1 introduced in the Philippines.

* 1. C. GRANDIFLORA (Roxb.) R. Br.

A stout woody vine, glabrous or nearly so. Leaves oblong-ovate to elliptic-ovate, acuminate, 6 to 10 cm long, base rounded. Cymes short. Sepals green, about 8 mm long. Corolla pale-purple, about 4 cm long, often wider than long. Follicles 10 to 12 cm long, woody.

Occasionally cultivated, fl. Aug.–Sept., and probably in other months, of recent introduction here. Supposed to be a native of Madagascar or tropical Africa, cultivated in India and in many other tropical countries.

2. STREPTOCAULON Wight & Arnott

Twining, pubescent, somewhat woody vines, usually slender. Leaves opposite. Flowers small, numerous, in axillary, lax, panicled cymes. Calyx small, 5-partite, with 5 scales within at the base. Corolla rotate, the tube very short, the lobes ovate, slightly imbricate. Corona-processes filiform, adnate to the backs of the filaments. Stamens inserted at the base of the corolla, alternating with minute glands; anthers oblong, adherent to the style-apex; appendages small, triangular, connate over the apex of the style; pollen-masses 2 in each cell. Ovary of 2 distinct carpels; style short. Follicles in pairs, divaricate, slender, pubescent. Seeds flattened, keeled on the lower surface; coma white, silky. (Greek "to twist" and "stem.")

Species about 7, India to Malaya, 2 in the Philippines.

1. **S. baumii** Decne.

A scandent woody vine, the stems rather slender. Leaves elliptic to elliptic-ovate, rounded or somewhat acuminate, base rounded, 7 to 15 cm long, 4 to 8 cm wide, pubescent, the lower surface rather densely so. Cymes axillary, solitary or in pairs, trichotomous, lax, 4 to 9 cm long. Calyx small, greenish. Corolla purple, rotate, 5 mm in diameter, the lobes ovate or oblong-ovate. Follicles cylindric, slender, pubescent, 5 to 9 cm long. (Fl. Filip. *pl. 138.*)

In thickets, occasional, fl. Oct.–Dec.; widely distributed in the Philippines. Endemic.

3. ASCLEPIAS Linnaeus

Erect perennial herbs with milky sap. Leaves opposite or whorled. Flowers in peduncled or sessile umbels, terminal or lateral, in our species red and orange-yellow. Calyx deeply 5-parted, with 5 to 10 glandular scales at the base within. Corolla rotate, deeply 5-lobed, the lobes valvate or slightly overlapping, usually reflexed when open. Corona of 5 processes arising from the staminal-column and adnate to it above, the lobes ovate, concave-hooded, with usually a horn-like tooth projecting from within. Stamens inserted on the base of the corolla; filaments connate into a tube; anthers with a membranaceous appendage inflexed over the apex of the style; pollen-masses 1 in each cell. Follicles variable, the pericarp usually coriaceous. Seeds comose. (The ancient Greek name.)

Species 80, chiefly in America and Africa, 1 introduced in the Philippines.

1. A. CURASSAVICA L. Milkweed.

An erect, simple or slightly branched, perennial, glabrous herb 40 to 60 cm high. Leaves opposite, lanceolate, to oblong-lanceolate, acuminate, base narrowed, 7 to 13 cm long. Umbels axillary and terminal, peduncled, few- to many-flowered. Sepals linear, green. Corolla-lobes red, reflexed, oblong, about 8 mm long. Column stipitate, the corona yellow, the flower, including the reflexed corolla, 1.2 to 1.4 cm long. Follicles lanceolate, acuminate, narrowed at both ends, 6 to 8 cm long, 1 to 1.3 cm in diameter in the middle. (Fl. Filip. *pl. 71.*)

In open waste places, fl. most of the year; common and widely distributed in the Philippines. A native of tropical America, now a weed in most tropical countries.

4. ISCHNOSTEMMA King & Gamble

Twining slender vines with opposite leaves. Inflorescence of slender; few-flowered, lateral, peduncled umbels, the pedicels slender. Calyx 5-fid. Corolla rotate, the tube short, the lobes long, slender, imbricate. Corona of 5, membranaceous, lanceolate, flattened processes attached to the base of the staminal-column. Staminal-column attached to the base of the corolla-tube, the anthers slender, the appendages short, thin, obtuse, connivent over the apex of the style; pollen-masses 1 in each cell, pendulous, ellipsoid. Ovary of 2 carpels; styles connate above. Follicles slender, long-acuminate, lanceolate in outline. Seeds small, flat, winged, comose. (Greek "vestige" and "wreath" or "crown.")

A monotypic genus.

1. **I. carnosum** (R. Br.) Merr. & Rolfe.

A slender, perennial, twining, glabrous vine 2 to 5 m high. Leaves smooth and shining, when fresh somewhat fleshy, elliptic-ovate to oblong, base rounded or acute, apex apiculate, 2 to 5 cm long, 1 to 3.5 cm wide, the petioles 5 to 10 mm long. Peduncles axillary, solitary, 5 to 10 mm long, each bearing from 1 to 3 or 4, subumbellately disposed flowers, the pedicels slender, up to 1.5 cm long. Flowers straw-colored, the corolla-tube very short, the limb spreading, radiate, nearly 1.5 cm in diameter, the corolla-lobes narrowly lanceolate, acuminate, curved.

In thickets along tidal streams, Pasay, fl. Aug.–Sept.; rare in the Philippines. Malay Peninsula and Australia.

5. GYMNEMA R. Brown

Woody or herbaceous twining vines with opposite ovate leaves. Flowers small in axillary umbels or umbelliform cymes. Calyx 5-parted. Corolla campanulate or subrotate, the lobes thick, twisted in bud, imbricate or subvalvate. Corona-processes 5, attached to the corolla-tube, of 5 fleshy lobes, adnate up to the mouth of the corolla, with more or less free incurved points, or of 5 pairs of fleshy ridges on the lower part of the tube alternating with the lobes. Column short. Anther-tips small, thin. Stigma large, conical, clavate, or capitate, exserted. Follicles slender, terete, acuminate, the seeds with a coma. (Greek "naked" and "filament.")

Species about 25 in Asia, Africa, Malaya, and Australia, 2 or 3 in the Philippines.

1. **G. tingens** (Roxb.) W. & A.

A rather slender woody vine reaching a height of 10 m, nearly glabrous. Leaves thin, ovate to elliptic-ovate, acuminate, base broadly rounded or somewhat cordate, 6 to 12 cm long, the nerves prominent beneath. Inflorescence axillary, many-flowered, solitary, somewhat pubescent, umbel-like, the pedicels equaling or longer than the peduncles. Flowers straw-yellow with a faint odor, about 5 mm long, slightly pubescent externally, the corolla-tube short, broad, the lobes ovate or oblong. Follicles about 10 cm long, lanceolate. Seeds flattened, about 1.3 cm long, the coma soft, white, shining. (Fl. Filip. *pl. 402, Bidaria inodora.*)

In thickets, Pasay, fl. July–Aug.; of local occurrence in the Philippines. India to southern China and the Malay Peninsula.

6. TYLOPHORA R. Brown

Twining, suffrutescent or somewhat woody vines with opposite leaves. Flowers small, in simple or branched axillary cymes. Calyx 5-parted, with 5 glands within. Corolla rotate or somewhat campanulate, deeply 5-lobed, lobes slightly imbricate. Corona of 5, small, fleshy, tubercular processes, adnate to the filament part of the staminal-column. Staminal-column attached to the base of the corolla; anthers with small, membranaceous appendages. Ovary of 2 carpels. Fruit of 1 or 2 follicles, slender, acuminate, smooth, sometimes inflated. Seeds comose. (Greek "knot" and "to bear" in allusion to the thickened processes of the corona.)

Species about 50, extending from India to Australia, about 10 in the Philippines.

1. **T. merrillii** Schltr.

A slender, twining, glabrous, herbaceous vine 2 to 5 m in length. Leaves green, shining; oblong to oblong-ovate, 5 to 8 cm long, shortly and sharply acuminate, base broad, rounded or slightly cordate. Inflorescence terminal and axillary, simple or slightly branched, slender, 10 to 30 cm long, the flowers numerous, in scattered, racemosely arranged fasicles, their pedicels 7 mm long or less, few in each fascicle. Flowers dull-purple, 4 to 5 mm in diameter. Follicles lanceolate, green, about 5 cm long, 5 mm thick below the middle, narrowed upward to the acuminate apex.

In thickets, Caloocan, Pasay, etc., fl. Oct.–Nov.; known only from the vicinity of Manila.

7. TELOSMA Coville

Twining, somewhat woody vines. Leaves opposite, ovate or oblong, cordate, acuminate, thin, glandular at the base. Cymes axillary, umbelliform. Flowers greenish-yellow, of medium size, pedicellate. Calyx 5-parted. Corolla somewhat salver-shaped, the tube swollen below, sometimes constricted at the throat, the lobes oblong, overlapping to the right, spreading in flower. Column rather large, the coronal scales rather large, adnate to the back of the anthers, erect, flattened laterally, somewhat notched at the apex; pollen-masses one in each cell, erect. Stigma umbonate or capitate. Fruit a lanceolate, terete, rather turgid follicle. Seeds ovate, concave; coma ample, soft. (Greek "far" and "odor," allusion to the fragrant flowers.)

Species about 12, tropical Asia and Malaya, about 2 in the Philippines.

Leaves small, deeply cordate at the base, 4 to 7 cm long, flowers fragrant; corolla-lobes 4 to 5 mm wide; a cultivated species...... 1. *T. odoratissima*
Leaves ample, base truncate, rounded, or slightly cordate, about 10 cm long; flowers odorless or nearly so, the corolla-lobes less than 3 mm wide........ 2. *T. procumbens*

*1. T. ODORATISSIMA (Lour.) Coville (*Pergularia odoratissima* Sm.). Mil leguas (Sp.-Fil.).

A scandent vine, the branchlets slender, terete, somewhat pubescent. Leaves opposite, broadly ovate, thin, 4 to 7 cm long, apex sharply acuminate, the base prominently cordate, the sinus and lobes rounded, slightly pubescent on the nerves and margins. Cymes axillary, subumbellate, many-flowered, somewhat pubescent. Flowers fragrant, yellowish-green, more deeply colored inside, about 1.3 cm long, the throat villous within, not or but slightly contracted.

Occasionally cultivated for its fragrant flowers, fl. July–Aug.; introduced from tropical Asia.

2. **T. procumbens** (Blanco) Merr. Mil leguas (Sp.-Fil.).

A woody vine, the branchlets slender, terete, glabrous or slightly pubescent. Leaves thin, ovate to oblong-ovate, 8 to 13 cm long, 3 to 8 cm wide, apex sharply acuminate, base rounded, truncate, or slightly cordate, slightly pubescent on the nerves beneath. Cymes axillary, umbelliform, many-flowered. Flowers greenish-yellow, odorless, about 1.5 cm long, the throat villous within, contracted. Follicles lanceolate, about 15 cm long. Seed flattened; coma white, soft, ample. (Fl. Filip. *pl. 397, Pergularia glabra.*)

In thickets, Masambong, Malinta, Pasay, etc., fl. July–Sept.; widely distributed in the Philippines at low altitudes. Endemic.

8. CONCHOPHYLLUM Blume

Epiphytic, twining or pendulous vines, with abundant milky sap and fleshy leaves. Leaves opposite or by abortion alternate, entire, thick, oblong to lanceolate and plane, or rounded and closely appressed to the trunks and branches of trees, usually with few to many axillary or extra-axillary rootlets. Flowers small, few to many, subumbellately or racemosely disposed near the tips of short or elongated, thickened peduncles which are marked with numerous scars of fallen pedicles. Calyx small, 5-toothed. Corolla subglobose, or cylindric and globose at the base, 5-toothed, with 5 inflexed scales at the contraction of the tube, the tube villous above the swollen base. Staminal column included, 5-angled, not appendaged on the back, the anthers tipped with a thin appendage; pollen-masses 1 in each cell. Ovary of 2 carpels. Follicles slender, acuminate, thin. Seeds small, coma white, silky. (Greek "shell" and "leaf" in allusion to the peculiar hollow leaves of some species.)

Species about 8, Malay Peninsula to New Guinea, 4 or 5 in the Philippines.

1. **C. merrillii** Schltr.

A glabrous, fleshy, much-branched, epiphytic vine with abundant milky sap, growing in small to large masses, the stems grayish, 2 to 5 mm in diameter, pendulous or climbing, often twining, reaching a length of 2 to 3 meters. Leaves oblong to narrowly oblong, 4 to 10 cm long, 1 to 2 cm wide, apex acute or apiculate, base acute, fleshy, 3 to 4 mm thick, the nerves none, the midrib obsolete or nearly so. Racemes axillary, the rachis short, thick, marked with numerous scars, bearing but few flowers at one time. Flowers rather bright-purple, their pedicels about 2 cm long, purple. Sepals oblong-ovate, obtuse, 1 mm long. Corolla swollen and globose at the base, about 3 mm in diameter, contracted above into a cylindric tube about 3.5 mm long, the tube with 5 appendages inside at the constriction, the reflexed parts glabrous, villous above the swollen base.

On various trees, Masambong, fl. Feb.–Sept.; known only from the vicinity of Manila.

9. HOYA R. Brown

Twining or pendulous, epiphytic, fleshy vines with abundant milky sap. Leaves opposite, fleshy, thick. Flowers in axillary racemes or umbels on thickened pedicles, or cymose. Calyx small, 5-partite. Corolla rotate, fleshy or waxy, the lobes 5, often convex, spreading or reflexed. Corona-processes 5, large, more or less fleshy, adnate to the staminal-column, the lower lobe spreading or ascending, often concave on the upper surface, the upper lobe usually produced into an erect tooth or process. Staminal-column short, attached to the base of the corolla; anthers conniving over the apex of the style, thin, the appendages membranaceous, erect or inflexed; pollen-masses 1 in each cell. Ovary of 2 distinct carpels. Fruit of 1 or 2 follicles, the pericarp thin; seeds comose. (In honor of T. Hoy, and English gardener.)

Species 80 or more, tropical Asia to Australia, about 20 in the Philippines.

1. **H. luzonica** Schltr.

A climbing, somewhat branched, glabrous vine with abundant milky sap, 3 to 4 m high. Leaves oblong, fleshy, acute or slightly acuminate, 9 to 13 cm long, the lower surface obscurely white-puncticulate, the nerves in fresh leaves scacely visible; petioles thickened, 1.5 to 2.5 cm long. Umbels axillary, solitary, the peduncles up to 7 cm long, the pedicels slender, 1 to 2.5

cm long. Flowers lilac-purple, about 1 cm in diameter, 10 to 12 or more in each umbel, the corolla rotate, the lobes broadly triangular-ovate, glabrous outside, inside densely papillose-pubescent. Capsules about 12 cm long.

In dry ravines opposite Guadalupe, rare, sometimes cultivated, fl. June; known only from Luzon and of every local occurrence.

10. DISCHIDIA R. Brown

Slender, usually epiphytic, twining or pendulous vines, climbing and rooting on trees. Leaves usually opposite, sometimes all flat, sometimes some of them converted into pitchers, or in some species all leaves convex and sessile, closely appressed to the surface on which the plant grows. Flowers small, white, yellow, or red, in axillary racemes, umbels, cymes, or fascicles, the peduncles usually thickened and marked with numerous scars. Calyx 5-partite, glandular within. Corolla campanulate, tubular, or urceolate, usually contracted at the mouth, the lobes valvate. Corona of 5 membranaceous processes adnate to the back of the staminal-column, erect, entire, notched, or bifid at the tips, or with incurved or recurved arms. Filaments connate into a very short tube; anthers with membranaceous appendages; pollen-masses 1 in each cell. Ovary of 2 carpels. Fruit of 1 or 2 small, slender, acuminate follicles; seeds comose. (Greek "two" and "cleft" in allusion to the cleft corona-segments.)

Species 60 or more, India to New Guinea and Australia, about 15 in the Philippines.

1. **D. pectenoides** Pearson. Dapo-boho (Tag.).

An herbaceous, epiphytic, glabrous vine usually growing on dead bamboo, the branches slender, pendulous, often twining. Leaves of two kinds, opposite, normal ones elliptic-ovate to lanceolate, acuminate, thick, fleshy, 1.5 to 2.5 cm long, one of some pairs hollow inside, inflated, 4 to 6 cm long, 4 to 5 cm wide, usually about 2 cm thick, the interior more or less filled with rootlets from the leaf-axil and with a much smaller interior ascidium usually the domicil of a colony of small black ants. Inflorescence axillary, solitary, umbellate, the peduncle 1 to 2 cm long. Flowers 3 to 8 in each umbel, the calyx small, green, the corolla cylindric, red, apex narrowed, about 8 mm long. Follicles slender, 5 to 7 cm long.

Not infrequently brought in from the neighboring provinces and cultivated in Manila; very curious on account of its symbiosis with ants, fl. most of the year. Known only from Luzon.

118. CONVOLVULACEAE (MORNING GLORY OR CAMOTE FAMILY)

Slender, spreading or prostrate herbs, or twining herbaceous or woody vines, sometimes with milky sap, with alternate, simple, entire or lobed, exstipulate leaves. Flowers axillary, solitary or cymose, regular, perfect, often large and showy, bracteate. Sepals 5, imbricate, usually persistent, often accrescent. Corolla campanulate, salver-shaped, or urceolate, rarely subrotate, the limb with 5 short or long lobes, often plicate in bud. Stamens 5, adnate to the corolla-tube. Ovary superior, of 2 usually connate carpels, often surrounded by an annular or lobed disk; ovules 2 in each carpel; style 1, rarely 2. Fruit an indehiscent, often dry berry, or a 2- to 4-valved, circumscissile, or irregularly dehiscent capsule. Seeds 2 or 4.

Genera 44, species about 1,000, in all parts of the world, but more abundant in tropical and subtropical regions, 17 genera and about 50 species in the Philippines.

1. Styles 2, free, each 2-branched; slender hairy herbs with subrotate flowers.......... 1. *Evolvulus*
1. Styles united, the stigmas 1 or 2; flowers campanulate, salver-shaped or urn-shaped.
  2. Corolla urn-shaped, the flowers in dense, axillary, subcapitate cymes. 2. *Lepistemon*
  2. Corolla salver-shaped.
    3. Flowers small, bright-red, the limb narrow.......... 3. *Quamoclit*
    3. Flowers very large, white, the limb broad.......... 4. *Calonyction*
  2. Corolla campanulate or funnel-shaped.
    3. Sepals much enlarged in fruit, often fleshy, quite enclosing the capsule.
      4. Stems 4-winged or flowers yellow; capsule dehiscent.. 5. *Operculina*
      4. Stems terete; capsule indehiscent.......... 6. *Stictocardia*
    3. Sepals not or but slightly enlarged in fruit.
      4. Fruit indehiscent.
        5. Leaves densely silky-pubescent beneath, with white, shining hairs.......... 7. *Argyreia*
        5. Leaves glabrous or pubescent, not white-silky-hairy.... 8. *Rivea*
      4. Fruit dehiscent or the walls fragile and soon breaking up.
        5. Ovary 1-celled.......... 9. *Hewittia*
        5. Ovary 2- to 4-celled.
          6. Corolla-tube with 5 vertical bands of 5 parallel lines each. 10. *Merremia*
          6. Corolla-tube with 5 vertical bands of 2 lines each.. 11. *Ipomoea*

1. EVOLVULUS Linnaeus

Slender, spreading herbs with small, entire leaves. Flowers small, axillary, solitary, or 2 or 3 on each peduncle. Sepals unequal. Corolla funnel-shaped, the limb 5-parted. Stamens included or exserted. Ovary 2- or 1-celled, 4-ovuled; styles 2, separate from the base, each cleft into 2 stigmas. Capsules globose, 4- or 2-valved, usually 4-seeded.

Species about 70, in all tropical and subtropical regions, mostly in tropical America, 1 in the Philippines. (Latin "to unroll," in reference to their non-twining habit.)

1. **E. alsinoides** L.

A very slender, more or less branched, spreading or ascending, usually very hairy herb, the stems 20 to 70 cm long, not twining. Leaves variable, hary, 0.5 to cm long, ovate elliptic, or oblong. Peduncles slender, longer than the leaves. Flowers pale-blue or nearly white, 6 to 8 mm in diameter.

In open dry grass lands near Fort McKinley, La Loma, etc., fl. Sept.–Feb.; widely distributed and possibly introduced in the Philippines. Cosmopolitan in tropical and subtropical regions.

2. LEPISTEMON Blume

Twining herbs with cordate, entire or slightly lobed, ovate, pubescent leaves. Flowers in very dense, axillary, subcapitate cymes, the bracts narrow, deciduous. Sepals 5, subequal, hairy, acute or obtuse. Corolla small, pale-yellow or nearly white, the tube narrowed and short-cylindric at the base, urn-shaped above, the limb shortly 5-lobed. Stamens 5, included, the filaments dilated at their concave bases and arched over the ovary; disk large, culpular. Ovary 2-celled; ovules 4; style short. Fruit a small, 4-valved capsule. (Greek "scale" and "filament," in reference to the scale at the base of each stamen.)

Species 3 in tropical Asia and Africa, 1 in the Philippines.

1. **L. binectariferum** (Wall.) O. Ktze. (*L. flavescens* Bl.).

An herbaceous twining vine, the stems villous. Leaves ovate, 5 to 12 cm long, densely tomentose on both surfaces, base deeply cordate, apex acute or acuminate, margins entire or somewhat 3-lobed. Cymes axillary, dense, globose, pubescent, 3 to 4 cm in diameter, few- to many-flowered. Sepals strigose, acuminate. Corolla pale-yellow, slightly hairy outside, urn-shaped, 1 to 1.5 cm long. Capsule ovoid, glabrous, 2-celled, about 5 mm long.

In dry thickets near Fort McKinley, Balicbalic, etc., fl. Jan.; widely distributed in the Philippines. Assam to Java and Borneo.

3. QUAMOCLIT Moench

Annual, twining, glabrous, slender, herbaceous vines. Leaves ovate, cordate, angled, lobed or pinnately divided. Flowers red, in few-flowered axillary, lax cymes. Sepals small, their apices often somewhat awned. Corolla salver-shaped, regular or nearly so, the tube long, the limb spreading, subentire or very slightly lobed. Stamens 5, exserted, filaments unequal. Ovary 4-celled, 4-ovuled. Fruit a 4-celled capsule. (Apparently from an old Mexican name.)

Species 7 in tropical America, 2 now widely distributed in the tropics of the East.

Leaves ovate, deeply cordate at the base, entire or broadly 3- to 5-lobed.. 1. *Q. phoenicea*
Leaves pinnately divided into numerous, linear segments........ 2. *Q. pinnata*

1. **Q. PHOENICEA** (Roxb.) Choisy (*Q. coccinea* Auct.). Pula (Tag. "red").

A scandent, twining, slender vine reaching a length of several meters. Leaves ovate, broadly cordate, acute or acuminate, margins subentire or angled, or broadly 3- to 5-lobed, 6 to 12 cm long. Cymes axillary, long-peduncled, few-flowered, the peduncles up to 15 cm long. Flowers erect, red. Sepals 5, green, about 6 mm long, obtuse, slenderly spurred from the apex. Corolla deep-red, the tube slender, slightly enlarged upward, 2.5 cm long, the limb spreading, about 2 cm in diameter. Capsule subglobose or ovoid, about 6 mm in diameter. (Fl. Filip. *pl. 17.*)

In thickets, San Juan del Monte, fl. Nov.–Apr.; of local occurence in the Philippines, but frequently very abundant, thoroughly naturalized. A native of tropical America now found wild and cultivated in many other tropical countries.

2. **Q. PINNATA** (Lam.) Bojer (*Q. vulgaris* Choisy). Cabello del angel (Sp.-Fil.); Cypress Vine.

A slender, twining, glabrous vine reaching a height of 4 m or more. Leaves ovate in outline, 4 to 7 cm long, pinnately divided into numerous, linear, distant segments. Cymes axillary, few-flowered, the peduncles 4 to 9 cm long. Flowers erect. Sepals green, about 5 mm long, apiculate, elliptic. Corolla deep-red, salver-shaped, the tube about 2 cm long, slightly enlarged upward, the limb spreading, 1.5 to 2 cm in diameter, distinctly 5-lobed. Capsule ovoid, 7 to 8 mm long. (Fl. Filip. *pl. 33.*)

Rather commonly cultivated, frequently spontaneous, fl. all the year; widely distributed in the Philippines and thoroughly naturalized. A native of tropical America, now found in many other tropical and warm countries, cultivated or wild.

4. CALONYCTION Choisy

Large, herbaceous, twining vines, the stems usually muricate. Leaves large, cordate, entire or angled. Flowers solitary or in few-flowered cymes. Sepals 5, smooth, usually prominently awned, the outer ones sometimes smaller than the inner. Corolla large, salver-shaped, usually pure-white, the tube narrow-cylindric, the limb plicate. Ovary 2-celled, cells 2-ovuled; style filiform. Stamens 5, somewhat exserted. Capsule 4-valved, 4-seeded. (Greek "beautiful" and "night" alluding to the large flowers which open at night.)

Species 6 or 7 all or mostly in tropical America, 2 or 3 now wide-spread in the tropics of the Old World.

Sepals prominently awned; stems usually muricate................ 1. *C. aculeatum*
Sepals obtuse, not awned or only slightly apiculate; stems glabrous. 2. *C. album*

1. C. ACULEATUM (L.) House. (*C. bona-nox* Boj.). Moon Flower.

An extensively climbing, twining, glabrous, vine, reaching a length of 10 m or more. Stems green, more or less muricate, or nearly smooth. Leaves ovate, entire or somewhat angled or lobed, sharply acuminate, base cordate, 14 to 20 cm long. Peduncles axillary, solitary, long, 1- to 5-flowered. Sepals in flower green, ovate, long-awned, about 2 cm long. Corolla-tube greenish-white, 8 to 10 cm long, about 6 mm in diameter, the limb spreading, about 15 cm in diameter, white, the plaits greenish. Fruit ovoid, pointed, about 3 cm long, surrounded at the base by the accrescent sepals, the pedicels much-thickened. (Fl. Filip. *pl. 332.*)

Occasional in thickets, fl. Aug.–March; widely distributed in the Philippines, throughly naturalized. A native of tropical America, now widely distributed in the tropics in cultivation and as a nauralized plant. The flowers open at night only and close shortly after dawn.

2. C. ALBUM (L.) House.

A scandent, somewhat woody, twining vine of indefinite length, glabrous, stems smooth or sometimes muricate. Leaves orbicular-ovate, entire, acuminate, base prominently cordate, 9 to 18 cm long. Peduncles axillary, short or somewhat elongated, 1- to 3-flowered. Sepals green, orbicular-ovate, imbricate, 1.5 to 2 cm long, rounded, sometimes minutely apiculate, enlarged in fruit. Corolla white, the tube cylindric, about 6 cm long, 8 mm in diameter, the limb spreading. Capsule globose, about 2 cm in diameter.

In thickets, Pasay, Tondo, etc., occasional, fl. Oct.–Jan.; not common in the Philippines. Tropics of both hemispheres.

5. OPERCULINA Manso

Large herbaceous climbers, the stems, peduncles, and petioles usually winged. Leaves large, entire or palmately lobed. Flowers large, axillary, solitary or in few-flowered cymes. Sepals 5, large, accrescent in fruit. Corolla campanulate, the tube with 5 vertical, smooth bands. Stamens 5; filaments filiform. Ovary 2-celled, 4-ovuled. Fruit a capsule enclosed by the enlarged sepals, the epicarp circumscissile above the middle, the endocarp at length breaking irregularly, not by regular valves. (From Latin "cover" in allusion to the sepals covering the fruit.)

Species about 15 in all tropical countries, 2 in the Philippines.

Leaves entire; flowers white; an herbaceous vine with 4-winged stems. 1. *O. turpethum*

Leaves deeply palmately 7-lobed; flowers yellow; a coarse woody vine with stout terete stems........ 2. *O. tuberosum*

1. **O. turpethum** (L.) Manso.

A scandent, herbaceous, slightly pubescent or nearly glabrous vine reaching a length of 5 m or more, the stems often purplish, prominently 2- to 4-angled and narrowly winged. Leaves ovate, entire, 5 to 15 cm long, entire, narrowed upward to the acute or acuminate apex, base broad, subcordate or truncate. Cymes axillary, peduncled, few-flowered, the bracts oblong, thin, caducous, about 2.5 cm long. Sepals green, ovate to oblong-ovate, the outer two 2 to 3 cm long, larger than the inner three, pubescent, persistent, accrescent, and somewhat fleshy, usually becoming purplish in fruit. Corolla white, campanulate, 4 cm long; the limb 4 cm wide. Capsule globose, 1 to 1.5 cm in diameter.

In thickets, common, fl. Oct.–Apr.; widely distributed in the Philippines, possibly introduced. Tropical Asia to the Mascarene Islands, Malaya, Australia, and Polynesia.

*2. O. TUBEROSUM (L.) Choisy (*Ipomoea tuberosa* L.).

A coarse, woody, perennial, glabrous vine reaching a length of 15 m and 10 cm or more in diameter. Leaves 12 to 20 cm in diameter, very deeply palmately 7-parted, the lobes lanceolate, acuminate, entire, base cordate. Flowers about 5 cm long, axillary, solitary, or several on a peduncle, long-peduncled, the peduncle thickened at the apex. Sepals green, about 2.5 cm long. Corolla campanulate, yellow, about 5 cm in diameter. Capsule globose, 2.5 to 3 cm in diameter, loosely enveloped by the accrescent calyx-lobes. Seeds large, about 2 cm long.

Occasionally cultivated, fl. all the year. A native of tropical America, now cultivated in many other tropical countries.

6. STICTOCARDIA Hallier fils

Coarse twining vines with ovate-cordate leaves and axillary flowers, the peduncles 1- to 3-flowered. Flowers large, pink or purplish. Sepals 5, imbricate, subequal, accrescent and completely enveloping the fruit, strongly imbricate, mucilaginous when fresh. Corolla funnel-shaped, large, showy, the limb shortly lobed. Stamens included. Ovary 4-celled, 4-ovuled. Capsule indehiscent, 4-celled, 4-seeded, entirely enclosed by the enlarged sepals. (From the Greek "punctured" and "heart" alluding to the characters of the fruit and its covering.)

Species about 4, in Africa, Madagascar, and Asia, 1 introduced in tropical America, 1 in the Philippines.

1. **S. tiliaefolia** (Lam.) Hallier f.

A scandent, twining, herbaceous, glabrous or nearly glabrous plant of indefinite length, the stems terete. Leaves ovate or orbicular, acute or shortly acuminate, entire, base prominently cordate, 6 to 15 cm long. Flowers axillary, short-pedicelled, usually solitary. Sepals green, obtuse, suborbicular, about 1.5 cm long, enlarged in fruit. Corolla widely funnel-shaped, rose-purple, 7 to 8 cm long, 5 to 6 cm in diameter. Fruit completely surrounded by the enlarged sepals, including the sepals 3.5 to 5 cm long, the capsule ovoid, 1.5 to 2 cm long.

In thickets, Pasay, fl. Oct.–Dec.; widely distributed in the Philippines. India to Malaya, elsewhere often cultivated.

7. ARGYREIA Loureiro

Large, twining, shrubby vines, the leaves lanceolate to cordate-ovate, white-silky-pubescent, at least on the lower surface. Flowers axillary, usually in many-flowered cymes, the bracts large. Sepals 5, thin in flower, in fruit thickened, often reddish inside. Corolla funnel-shaped or campanulate, pink or pale-purple, usually hirsute externally, the limb plicate, shortly 5-lobed. Stamens 5, included. Ovary 4-celled, 4-ovuled; style filiform. Fruit a hard dry berry or indehiscent capsule. (Greek "silvery," from the white hairs).

Species about 30, mostly in the tropics of the Old World, 2 in the Philippines.

Leaves up to 30 cm in length, prominently cordate.................... 1. *A. nervosa*
Leaves 15 cm long or less, obtuse or acute at the base................ 2. *A. mollis*

* 1. **A. NERVOSA** (Burm.) Boj. (*A. speciosa* Sweet).

A coarse, twining, perennial, woody vine, the stems often 5 cm or more in diameter, reaching a length of 15 m or more. Leaves broadly ovate, entire, acuminate, base prominently cordate, 12 to 30 cm long, the upper surface glabrous, the lower surface densely and softly pubescent with grayish or whitish hairs, as are the branchlets, petioles, and inflorescence. Peduncles axillary, stout, up to 30 cm in length, the flowers crowded at the ends, subtended by large, thin, deciduous bracts. Calyx ovoid, about 1.5 cm long. Corolla 6 to 7 cm long, the tube at first slender, then abruptly inflated, somewhat tubular, and 2 to 2.5 cm in diameter, the limb somewhat spreading, about 6 cm in diameter, externally pubescent and pale-lilac, internally rather deep-purple. Fruit subglobose, brown, about 1.5 cm in diameter.

Quite commonly cultivated, fl. June–Dec. Introduced in about the year 1903; a native of British India.

2. **A. mollis** (Burm.) Choisy. (*A. nitida* Choisy).

A scandent, twining, somewhat woody vine reaching a height of at least 10 m, all parts pubescent. Leaves ovate to oblong-ovate, acute, 8 to 15 cm long, densely white-pubescent and shining beneath. Peduncles axillary and terminal, short, 1- to 4-flowered, the outer 3 sepals pubescent, green, oblong, 1.5 cm long, the inner 2 shorter. Corolla campanulate, pubescent and whitish or pale-purplish externally the limb purple, about 6 cm long, 4 cm wide. Fruit depressed-globose, about 1 cm in diameter, surrounded by the enlarged sepals. (Fl. Filip. *pl. 412, A. nitida.*)

In thickets, Caloocan to Masambong, occasional, fl. Oct.–Dec.; widely distributed in the Philippines. Malaya.

8. RIVEA Choisy

Twining shrubs with ovate-cordate, glabrous or pubescent, entire leaves. Peduncles axillary, solitary, 1- to 5-flowered, sometimes arranged in leafy racemes. Sepals ovate to oblong, unequal or subequal. Corolla campanulate or widely funnel-shaped; plaited. Stamens included. Ovary 4-celled, 4-ovuled; style filiform. Fruit subglobose, nearly dry, indehiscent or irregularly breaking up; seeds 1 to 4, glabrous.

Species about 25, in most tropical countries, about 4 in the Philippines.

1. R. **CORYMBOSA** (L.) Hallier f. (*Ipomoea sidaefolia* Choisy).

A scandent, somewhat woody vine reaching a height of at least 10 m, glabrous throughout. Leaves ovate, entire, acute or acuminate, base deeply cordate, 6 to 10 cm long. Peduncles axillary, solitary, in leafy racemes, each peduncle umbellately about 5-flowered, or the terminal ones racemose. Calyx green, 10 to 12 mm long, the lobes oblong, unequal. Corolla campanulate, 2.5 cm long, pale-green and white, dark-purplish at the base inside. Capsule ellipsoid, glabrous.

In thickets, Masambong, fl. Oct.–Nov. A native of tropical America, introduced here as an ornamental and now naturalized, but at present known in the Philippines only from the vicinity of Manila.

9. HEWITTIA Wight & Arnott

Herbaceous, twining, slender, more or less pubescent vines. Leaves ovate, cordate at the base, angular, entire or obscurely lobed. Peduncles axillary, the flowers solitary, or few and subcapitate. Sepals acute, the outer ones enlarged in fruit. Corolla campanulate, the limb 5-plaited. Ovary hirsute, 1-celled, 4-ovuled. Capsule globose, 4-valved, 1-celled, usually 4-seeded. (Named for — Hewitt.)

A monotypic genus.

1. H. **SUBLOBATA** (L. f.) O. Kuntze. (*H. bicolor* Wight).

A slender vine reaching a length of from 2 to 4 m. Leaves 3 to 10 cm long, acuminate or acute, base cordate. Peduncles longer than the petioles. Calyx green. Corolla straw-colored or nearly white, the center usually dark-purple or brownish-purple inside, hairy externally, about 2 cm long, the limb about 2.5 cm in diameter.

In thickets and open grass lands, occasional, fl. more or less all the year; throughout the Philippines, certainly introduced. Widely distributed in the tropics.

10. MERREMIA Dennstaedt

Herbaceous or shrubby twining vines, sometimes prostrate the stems mostly cylindric. Leaves entire, lobed, or divided. Flowers axillary, solitary, or in few- to many-flowered cymes, the bracts small. Sepals 5, rounded or acuminate, subequal. Corolla campanulate, white to yellow, the tube with 5 vertical bands each usually marked by 5 pale or violet lines, the limb plicate, margins slightly lobed. Stamens 5, unequal; anthers usually twisted. Ovary 2- or 4-celled; ovules 4. Fruit a 4-valved capsule, 1- to 4-celled. (In honor of B. Merrem, a German botanist.)

Species about 60 in all warm countries, 10 in the Philippines.

1. Corolla quite glabrous outside; leaves glabrous or only slightly pubescent.
    2. Sepals long-acuminate; corolla with a pale-purple center.. 1. *M. hastata*
    2. Sepals obtuse; flowers uniformly yellow.
        3. Leaves narrow, linear to oblong, or the lower ones ovate-oblong and subcordate........ 2. *M. hirta*
        3. Leaves broadly ovate, deeply cordate.

4. Peduncles very short are nearly wanting, 1- to 3-flowered, the petioles much longer than the inflorescence.......... 3. *M. emarginata*
4. Peduncles elongated, usually many-flowered, the inflorescence equaling or longer than the leaves.
5. Leaves usually crenate or toothed, often lobed, 2 to 4 cm long. 4. *M. hederacea*
5. Leaves entire, 4 to 9 cm long.................................... 5. *M. gemella*
1. Corolla somewhat hairy outside; leaves softly pubescent; flowers in dense, peduncled cymes, white or yellow......................... 6. *M. umbellata*

1. **M. hastata** (Desr.) Hallier f.

A slender, glabrous, diffuse, branched, annual vine reaching a length of 1 to 2 m or more. Leaves sessile or shortly petioled, oblong-lanceolate to narrowly lanceolate, acuminate, base prominently hastate, 3 to 6 cm long. Peduncles axillary, solitary, long, usually 1-, rarely 2- or 3-flowered. Flowers pale-yellowish or nearly white, the center purple, about 1.5 cm long, funnel-shaped. Capsule ovoid or subglobose, 1- or 2-seeded, 5 to 6 mm long, the pericarp thin.

In open, dry, grass lands, San Pedro Macati etc., fl. Aug.–March; widely distributed in the Philippines, probably introduced. Tropical Asia and Africa through Malaya to Australia.

2. **M. hirta** (L.) Merr. (*M. caespitosa* Hallier f.).

A slender, twining or creeping, glabrous or slightly hairy annual herb reaching a length of 1 to 2 m. Leaves narrowly oblong to lanceolate, base rounded or obtuse, apex acute, the lower ones often ovate-oblong and subcordate, 2 to 3.5 cm long. Flowers axillary, the peduncles usually 1- or 2-flowered. Calyx green, about 5 mm long, the lobes oblong, obtuse. Corolla pale-yellow, about 1.5 cm in diameter. Capsule ovoid, about 5 mm long, papery, 1-celled.

In open wet grass-lands, Novaliches road, fl. Oct.–Dec.; widely distributed in the Philippines, possibly introduced. India to China, southward to Australia.

3. **M. emarginata** (Burm.) Hallier f.

A slender, prostrate, creeping herb, glabrous or somewhat hairy, the stems rooting at the nodes, 10 to 80 cm in length. Leaves small, reniform to ovate-cordate, irregularly toothed, 6 to 15 mm long, often wider than long. Flowers 1 to 3 on the very short peduncles. Sepals rounded, about 4 mm long, ciliate with few to many white weak hairs. Corolla yellow, nearly twice as long as the calyx. Capsule globose, about 5 mm in diameter.

In open dry grass lands, occasional, fl. Nov.–Jan.; of local occurrence in the Philippines, possibly introduced. Tropical Asia and Africa.

4. **M. hederacea** (Burm.) Hallier f. (*M. convolvulacea* Dennst.).

A slender, twining, glabrous or nearly glabrous annual, 1 to 3 m in length. Leaves ovate, 2 to 4 cm long, subentire or 3-lobed, crenate or toothed, acuminate, base prominently cordate. Peduncles axillary, about as long as the petioles, with 3 to 5 or more flowers. Calyx green, about 4 mm long. Corolla yellow, about 1.5 cm in diameter, the lobes emarginate.

In open waste places, fl. Sept.–Jan.; of local occurrence in the Philippines, possibly introduced. Tropical Asia and Africa.

5. **M. gemella** (Burm.) Hallier f.

A slender, twining, glabrous vine reaching a length of 4 to 5 m. Leaves ovate, 4 to 9 cm long, entire, sharply acuminate, base prominently cordate, the lobes rounded. Cymes axillary, solitary, peduncled, 8 to 15 cm long, usually many-flowered. Sepals green, elliptic, obtuse, 5 to 6 mm long. Corolla yellow, about 2.5 cm long, funnel-shaped. Capsule ovoid, about 1 cm in diameter.

In thickets and open places, fl. Oct.–Feb.; widely distributed in the Philippines, possibly introduced. Tropical Asia and Africa, through Malaya to Australia.

6. **M. umbellata** (L.) Hallier f. var. **orientalis** Hallier f.

A twining herbaceous vine, more or less pubescent, the stems slender. Leaves oblong to oblong-ovate, 8 to 12 cm long, acute or acuminate, entire or nearly so, base cordate, softly pubescent on both surfaces. Peduncles axillary, solitary, shorter than or equaling the petioles, the inflorescence cymose, dense, many-flowered. Sepals about 6 mm long. Corolla white, tubular-funnel-shaped about 3 cm long, the limb about 2.5 cm in diameter. Capsule ovoid, glabrous, about 1 cm long, the seeds covered with spreading black or brown hairs.

In open places, thickets, etc., fl. Dec.–March; widely distributed in the Philippines, probably introduced. Tropical Asia, Africa, Malaya, and Australia.

Var. OCCIDENTALIS Hallier f.

Similar to the above, but flowers yellow.

Rare in Manila, apparently introduced. Tropical America, introduced in Bengal and in the Malay Peninsula.

11. IPOMOEA Linnaeus

Twining or prostrate herbaceous vines with alternate, entire, lobed, or divided leaves. Flowers axillary, solitary or cymose. Sepals ovate to linear, equal or unequal. Corolla usually campanulate, the limb plicate, slightly 5-lobed. Stamens 5, included or rarely exserted, the filaments sometimes dilated at the base. Ovary 2- or 3-celled, rarely 4-celled; ovules usually 4. Fruit a 4- to 6-valved capsule, rarely indehiscent. (From the Greek "bind-weed" and "like.")

Species about 300, in all tropical countries, about 15 in the Philippines.

1. Sepals much elongated, the tips oblong to linear-lanceolate, clothed with long spreading hairs at the base.
  2. Leaves 3-lobed.................... 1. *I. nil*
  2. Leave entire.................... 2. *I. purpurea*
1. Sepals not much elongated, glabrous or hairy, never linear-lanceolate.
  2. Leaves hairy on both surfaces, deeply 5- to 9-lobed; flowers white. 3. *I. pes-tigridis*
  2. Leaves glabrous or only slightly hairy.
    3. Leaves deeply 5- to 9-lobed.
      4. Corolla pink-purple, the lobes of the leaves reaching about two-thirds to the base.................... 4. *I. digitata*
      4. Corolla lavender-purple, the lobes of the leaves extending quite or nearly to the base.................... 5. *I. cairica*

3. Leaves entire or shallowly 3-lobed or angled.
    4. Leaves suborbicular, prominently retuse or 2-lobed at the apex. 6. *I. pes-caprae*
    4. Leaves ovate to oblong-ovate, acute or acuminate.
        5. Corolla less than 2.5 cm long.
            6. Leaves entire; flowers yellowish-white with a dark-purple base, the inflorescence 1- to 3-flowered, glabrous. 7. *I. obscura*
            6. Leaves usually shallowly lobed or angled; flowers pink or purplish, the sepals ciliate-hirsute........................ 8. *I. triloba*
        5. Corolla about 5 cm long.
            6. Sepals acute or obtuse; aquatic or swamp herbs, the stems often thick and spongy.. 9. *I. reptans*
            6. Sepals prominently acuminate; cultivated plants with thick tuberous roots.. 10. *I. batatas*

1. I. NIL (L.) Roth.

A twining, rather slender, herbaceous, more or less hirsute annual vine, reaching a length of several meters. Leaves prominently 3-lobed, 8 to 15 cm long, subovate in outline, base cordate. Peduncles axillary, solitary, shorter than the petioles, each 1- to 6-flowered. Sepals densely hirsute at the base, about 3 cm long, the tips linear. Corolla pale-blue, or the tube white within, turning pink-purple, about 5 cm long, the limb shallowly 5-lobed. Capsule about 1 cm in diameter. (Fl. Filip. *pl. 66.*)

In open waste places, occasional, fl. all the year; widely distributed in the Philippines. A native of tropical America, now in most tropical and subtropical countries.

* 2. IPOMOEA PURPUREA (L.) Lam. Aurora (Sp.-Fil.); Morning Glory.

A slender, twining, herbaceous, somewhat hirsute vine reaching a length of several meters. Leaves broadly ovate, entire, acuminate, base cordate, 5 to 12 cm long. Peduncles 1- to 3-flowered. Calyx hirsute with spreading hairs, green, about 12 cm long, the lobes oblong. Corolla narrowly campanulate, 4 to 5 cm long, the tube white tinged with purple, the limb deep-purple. Capsule globose, apiculate, about 1 cm long, shorter than the persistent, somewhat enlarged sepals.

Occasionally cultivated, not spontaneous, fl. all the year. A native of tropical America, much cultivated in most warm countries.

3. I. PES-TIGRIDIS L.

A twining, herbaceous, annual vine, all parts more or less hirsute with rather long, spreading, pale or brownish hairs. Leaves 6 to 10 cm in diameter, palmately 5- to 9-lobed, suborbicular in outline, base cordate, both surfaces somewhat hirsute, the lobes elliptic, acuminate, base narrowed, sinuses rounded. Flowers in long-peduncled, axillary heads, the outer bracts hairy, oblong, green, up to 3 cm long, the inner ones smaller. Flowers few in each head, usually only one opening at a time. Calyx green, about 1 cm long. Corolla white, 4 cm long, the limb about 3 cm in diameter. Fruit globose, 6 to 7 mm in diameter.

In waste places, fairly common, fl. all the year; throughout the Philippines, but apparently introduced here. Tropical Africa through India to China, Malaya, and Polynesia.

4. **I. digitata** L. (*I. paniculata* R. Br.).

A large, glabrous, perennial climber from stout, somewhat fleshy roots. Leaves palmately 5- or 7-lobed, base cordate, orbicular in outline, 5 to 15 cm long, the lobes often reaching nearly to the base, usually lanceolate. Peduncles axillary, equaling or longer than the petioles, cymosely 3- to 5-flowered. Sepals ovate, concave, 1 cm long. Corolla pink-purple, widely campanulate, glabrous, about 6 cm long. Capsule ovoid, 1 cm long or less, 4-celled, 4-valved. (Fl Filip. *pl. 81*, *Convolvulus paniculatus*.)

In thickets, Singalon, Pasay, etc., not common, fl. Aug.–Oct. Apparently rare in the Philippines and only near the sea. Tropics generally.

* 5. I. CAIRICA (L.) Sweet. (*I. palmata* Forsk.).

A perennial, somewhat woody, glabrous, slender vine, the stems twining, grayish, branched. Leaves broadly ovate in outline, 6 to 9 cm in diameter, 5- or 7-parted, the segments elliptic-lanceolate, acute or acuminate, entire, or the lowest pair lobed. Calyx 8 to 10 mm long, green. Corolla campanulate, deep-lavender or mauve, about 6 cm long, 5 to 6.5 cm broad, the tube outside paler than the rest of the flower, inside deep-purplish. (Fl. Filip. *pl. 32*, *I. tuberosa*.)

Very commonly cultivated for covering walls, porches, etc., subspontaneous, fl. all the year; in towns generally throughout the Philippines. A native of northern Africa.

6. **I. pes-caprae** (L.) Roth.

A wide-spreading, creeping or twining, glabrous vine. Leaves thick, shining, orbicular, 6 to 14 cm long, apex emarginate or 2-lobed, base broad, rounded or truncate. Peduncles axillary, solitary, usually as long as the petioles, erect, 1- to 6-flowered, usually only one flower opening at a time. Sepals green, elliptic, obtuse or apiculate, 8 mm long. Corolla campanulate, purple, 5 cm long, the limb 5 to 6 cm in diameter, slightly lobed. Capsule about 1 cm long. (Fl. Filip. *pl. 29*.)

Along the seashore, abundant, fl. Oct.–May; on sandy seashores throughout the Philippines. Tropics generally.

7. **I. obscura** (L.) Ker.

A slender, twining, herbaceous, glabrous, annual vine, the stems 1 to 1.5 mm in diameter. Leaves broadly ovate, entire, acuminate or acute, base prominently cordate, the sinus broad, rounded, 2.5 to 6 cm long. Peduncles axillary, elongated, 1- to 3-flowered. Sepals ovate, acute or acuminate. Corolla about 2.5 cm wide, the tube narrow, yellowish-white or straw-colored, dark-purple at the base inside. Capsules ovoid, pointed, about 1 cm long, glabrous, 2-valved, 4 or 2-seeded, seeds about 5 mm long, brown-velvety.

In dry open grasslands and in thickets, fl. July–Jan.; widely distributed in the Philippines. India to the Mascarene Islands, China, and Malaya.

8. I. TRILOBA L. (*I. blancoi* Choisy).

A twining, herbaceous, slender, annual vine, glabrous except the inflorescence, the stems green, somewhat angled, about 2.5 mm thick. Leaves broadly ovate, entire or somewhat 3-lobed, acuminate, base broadly cordate, 4 to 11 cm long, often nearly as wide. Peduncles axillary, solitary, 2 to 8 cm long, bearing from 3 to 5 rather crowded flowers at the apex. Sepals green, about 8 mm long, the margins, at least below, ciliate-hirsute. Corolla pink or pink-purple, 1.5 cm long. Capsule depressed-globose, apiculate, about 6 mm in diameter, somewhat hirsute. (Fl. Filip. *pl. 31, I. commutata.*)

Common in open waste places etc., fl. all the year; widely distributed in the Philippines. Introduced from tropical America, now found also in Singapore, Java, and Mauritius.

9. **I. reptans** (L.) Poir. (*I. aquatica* Forsk.). Cancong (Tag.).

An annual, glabrous, widely spreading vine the stems trailing on mud or floating on stagnant pools, often thickened. Leaves oblong-ovate, acute or obtuse, or slightly sinuate, angled, or lobed, base cordate or hastate, 7 to 14 cm long, long-petioled. Pedicels axillary, erect, usually 1- or 2-flowered. Sepals green, 8 mm long, oblong, obtuse or acute. Corolla narrowly-campanulate, about 5 cm long, purplish, the limb nearly white or pale-pink-purple, about 5 cm in diameter, the tube deeper purple inside. Capsule ovoid, about 1 cm long. (Fl. Filip. *pl. 149.*)

In stagnant pools, open muddy places, etc., fl. all the year; widely distributed in the Philippines. Tropical Africa and Asia through Malaya to Australia.

*10. I. BATATAS (L.) Poir. Camote (Sp.-Fil.); Sweet Potato.

A spreading, prostrate, herbaceous, glabrous or somewhat hairy vine from small or large, red, white, or yellow tubers. Leaves ovate to oblong-ovate, 6 to 14 cm long, subentire, angular or lobed, acuminate, base cordate. Peduncles axillary, about as long as the petioles, erect, several-flowered. Sepals about 1 cm long, greenish, the lobes acuminate. Corolla campanulate, 4 to 5 cm long, pink-purple and whitish.

Occasionally cultivated in our area, fl. most or all of the year; extensively cultivated throughout the Philippines. A native of tropical America, now cultivated in most warm countries.

119. HYDROPHYLLACEAE (HYDROLEA FAMILY)

Herbs with alternate, entire leaves and regular, perfect, 5-merous, blue flowers in short, terminal and axillary, often leafy racemes. Calyx divided nearly to the base, the segments lanceolate. Corolla subrotate, the lobes imbricate. Stamens 5, attached to the short corolla-tube, alternate with its lobes. Ovary 2-celled; styles 2, distinct; ovules numerous. Capsule globose or ovoid, septicidal or irregularly 4-valved.

Genera 17, species about 175, mostly American, a single representative in the Philippines.

HYDROLEA Linnaeus

Characters of the Family as given above. (Greek "water" and "oil" from the habitat and nature of some species.)

Species 12, tropics of both hemispheres, 1 in the Philippines.

1. **H. zeylanica** (L.) Vahl.

An annual, ascending or procumbent, sparingly branched nearly glabrous plant a few cm to 1.2 m in length. Leaves lanceolate, acute or acuminate, 4 to 10 mm long. Inflorescence and sepals covered with spreading, viscid hairs. Sepals green, about 5 mm long. Corolla blue, 8 to 10 mm in diameter. Capsule ovoid, surrounded by the persistent calyx-lobes.

In open wet places, rice paddies etc., often in shallow pools, Masambong, Pasay, etc., fl. Dec.–Feb.; widely distributed in the Philippines. India to China southward to Queensland.

120. BORAGINACEAE[1] (BORAGE OR ANONANG FAMILY)

Herbs, shrubs, or trees. Leaves alternate, mostly entire, simple, stipules none. Inflorescence mostly terminal, of forked, scorpoid cymes, sometimes spike-like, or corymbose. Flowers perfect. Calyx inferior, subentire, or 5-, rarely 4- to 8-lobed or toothed, usually persistent. Corolla tubular, 4- to 8-, mostly 5-lobed. Stamens as many as the corolla-lobes, alternate with the lobes, inserted on the tube. Ovary superior, 2-celled, 2-ovuled, or 4-celled, 1-ovuled; style terminal or from between the ovary-lobes. Fruit a small drupe or divided into 2 or 4 nutlets.

Genera 85, species more than 1,200 in most parts of the world, 10 genera and 21 species in the Philippines.

1. Shrubs, trees, or climbing vines.
  2. Erect shrubs or trees.
    3. Styles single, twice forked .... 1. *Cordia*
    3. Styles 2, or single and 2-lobed .... 2. *Ehretia*
  2. Scandent .... 3. *Tournefortia*
1. Herbs.
  2. Inflorescence scorpoid .... 4. *Heliotropium*
  2. Inflorescence not scorpoid.
    3. Erect, branched, the flowers of medium size in open leafy racemes or panicles .... 5. *Trichodesma*
    3. Prostrate, spreading, the flowers small, axillary, solitary or in very short spikes .... 6. *Coldenia*

1. CORDIA Linnaeus

Trees or shrubs. Leaves alternate, petioled, often repand or undulate. Flowers in terminal dichotomous corymbs, ebracteate, polygamous, those with perfect flowers smaller than those with male ones. Calyx tubular or bell-shaped, teeth short, often irregular, in fruit accrescent and persistent. Corolla funnel-shaped, 4- to 8-lobed, the lobes spreading, white or yellow. Stamens as many as the corolla-lobes; filaments often hairy at the base. Ovary 4-celled, glabrous; style bipartite, the arms again cleft. Drupe ovoid or ellipsoid, stone bony, 1- to 4-celled, usually only 1 cell with a seed. (In honor of E. Cordus, an early German botanist.)

Species about 180, in all tropical countries, 3 in the Philippines.

1. **C. myxa** L. (*C. blancoi* Vid.)). Anonang (Tag.)

A tree 5 to 10 m high, glabrous or nearly so. Leaves ovate to oblong-ovate or elliptic-ovate, 6 to 15 cm long, entire or somewhat undulate-repand, shortly blunt-acuminate, base acute, or subcordate-rounded. Inflorescence corymbose, axillary and terminating short lateral branches, lax, 5 to 10 cm long. Flowers white or yellowish-white, sessile, about 7 mm long. Calyx ovoid. Corolla-tube not longer than the calyx, the lobes spreading, throat and stamens villous, the lobes reflexed. Drupe ovoid, yellowish-white, 10 to 13 mm long, pulp rather scanty, stone hard, the persistent calyx broadly funnel-shaped, enlarged, about 8 mm in diameter. (Fl. Filip. *pl. 48, C. sebestena.*)

In thickets, Pasay, etc., fl. Apr.–June; widely distributed in the Philippines. India to Malaya.

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[1] For a consideration of all the known Philippine species of this family see Robinson, C. B., "Philippine Boraginaceae." *Philip. Journ. Sci.* 4, (1909) *Bot.* 687–698.

2. EHRETIA Linnaeus

Erect shrubs or trees. Leaves alternate, entire or toothed. Inflorescence of terminal or axillary corymbs or panicles, or flowers solitary and axillary. Flowers small, white, 5-merous. Calyx 5-partite. Corolla-tube cylindric or short, 5-lobed, lobes spreading or reflexed. Stamens 5, inserted on the corolla-tube. Ovary 2-celled, cells 2-ovuled; style terminal, cleft or 2-cleft. Fruit a small, 4- to 1-seeded drupe. (In honor of D. G. Ehret, a Bavarian botanist.)

Species 50, mostly in tropics of the Old World, 4 in the Philippines.

Leaves ample, 8 to 18 cm long; styles single, bifid; a tree. 1. *E. navesii*

Leaves small, 1 to 6 cm long, in alternate fascicles; styles usually 2, undivided; a small shrub.. 2. *E. microphylla*

1. **E. navesii** Vid.

A tree 4 to 10 m high, the inflorescence and leaves, when young, somewhat pubescent beneath, becoming glabrous or nearly so. Leaves oblong-ovate, elliptic-ovate, or ovate, entire, 8 to 18 cm long, acuminate, base usually rounded. Corymbs terminal and axillary, peduncled, 5 to 10 cm long, few- to many-flowered. Flowers white, about 8 mm long. Style simple, bifid. Fruit ovoid, somewhat fleshy, about 5 mm long. (Fl. Filip. *pl. 70, E. virgata.*)

In thickets, Masambong to Guadalupe, occasional, fl. May–June; widely distributed in the Philippines. Endemic.

2. **E. microphylla** Lam. (*E. buxifolia* Roxb.). Cha, Chaa-bundoc (Tag.).

An erect, much branched shrub 1 to 4 m high. Leaves in alternate fascicles, obovate to oblong-obovate, scabrous, 1 to 6 cm long, entire or somewhat toothed or lobed near the apex, base narrowed, subsessile or shortly petioled. Flowers axillary, solitary, or 2 to 4 on a common peduncle, the inflorescence shorter than the leaves, somewhat hairy. Calyx-lobes green, somewhat hairy, linear, 5 to 6 mm long. Corolla white, 5 mm long, the lobes oblong, obtuse. Fruit drupaceous, globose, somewhat fleshy, yellow, 4 to 5 mm in diameter, the stone globose, 4-seeded. (Fl. Filip. *pl. 72, E. heterophylla.*)

In dry thickets and open places opposite Guadalupe, near Fort McKinley, etc., fl. all the year; widely distributed in the Philippines. India to Formosa and Malaya.

3. TOURNEFORTIA Linnaeus

Erect trees or shrubs or climbing vines. Leaves alternate, entire. Inflorescence terminal, forked, scorpoid. Flowers many, small, sessile or subsessile, densely arranged, white or greenish. Sepals 5 or 4. Corolla-tube cylindric, the 5 or 4 small lobes spreading. Stamens 5 or 4, included in the corolla-tube. Ovary 4-celled; style terminal, short; ovules 1 in each cell. Fruit small, ovoid, somewhat drupe-like, not distinctly separating into 2 or 4, 2- or 1-seeded pyrenes. (In honor of J. D. de Tournefort, a French botanist.)

Species about 100 of wide tropical distribution, 3 in the Philippines.

1. **T. sarmentosa** Lam.

A scandent, somewhat woody vine of indefinite length, somewhat pubescent. Leaves oblong, green, shining, somewhat harsh, 8 to 15 cm long, acute or shortly acuminate, base usually rounded. Cymes terminal, dichotomous, scorpoid, 10 cm in diameter or less. Flowers sessile, pale-green, 5-merous. Calyx 1.5 mm long, pubescent. Corolla 5 mm long, the 5-lobed limb 3.5 mm in diameter. Fruits sessile, globose, 4 to 5 mm in diameter. (Fl. Filip. *pl. 46.*)

In thickets, Pasay, fl. most of the year, rare in our area; widely distributed in the Philippines and not uncommon. Mauritius to Malaya and Australia.

4. HELIOTROPIUM Linnaeus

Annual, more or less villous herbs. Leaves alternate. Cymes terminal, spike-like or forked, scorpoid. Flowers small, perfect, white or pale-blue. Calyx 5-lobed, the segments lanceolate or linear. Corolla tubular, throat not hairy, lobes short, spreading. Stamens 5, inserted on the corolla-tube, included. Ovary completely or imperfectly 4-celled, 4-ovuled; style terminal, ending in a depressed-conical or flat disk. Fruit dry, 2- or 4-lobed, of 2 or 4 nearly free or more or less united nutlets. (Greek "sun" and "to turn.")

Species about 100, widely distributed in warm countries, 3 or 4 in the Philippines.

1. **H. INDICUM** L. Hinlaloyon (Tag.); Trompa elefante (Sp.-Fil.).

An annual, erect, branched, hirsute plant 15 to 50 cm high. Leaves opposite or alternate, ovate to ovate-oblong, somewhat hairy, acute or acuminate, base decurrent along the petiole, 3 to 8 cm long. Spikes terminal or leaf-opposed, 3 to 10 cm long, curved, flowers all on one side the lower ones opening first. Calyx green. Corolla pale-lavender to nearly white, about 5 mm long, the limb 3 to 3.5 mm in diameter. Fruit 4 to 5 mm long, composed of 2, ovoid, beaked cocci or nutlets. (Fl. Filip. *pl. 184.*)

A common weed in waste places, fl. all the year; undoubtedly introduced here, throughout the Philippines. Tropics generally.

5. TRICHODESMA R. Brown

Annual, erect, hispid, branched herbs. Leaves opposite, entire, the upper ones alternate. Flowers pedicelled, axillary, by reduction of the leaves forming terminal racemes, 5-merous. Calyx deeply cleft, the lobes enlarged in fruit. Corolla-tube cylindric-campanulate, the lobes 5. Stamens 5, the anthers convivent in a cone, tips at length twisted. Ovary 4-celled; style terminal. Fruit somewhat 4-ribbed, composed of 4 nutlets, finally separating. (Greek "hair" and "band," in reference to the anthers being bound together by hairs.)

Species about 10, warner parts of Africa and Asia, to Australia, 2 introduced in the Philippines.

Calyx-lobes in fruit cordate or hastate at the base................ 1. *T. indicum*
Calyx-lobes in fruit rounded or acute at the base................ 2. *T. zeylanicum*

1. **T. INDICUM** (L.) R. Br.

An erect or diffuse, branched, annual herb, 50 cm high, villous and bristly-hairy. Leaves sessile, lanceolate, 2 to 8 cm long, acute or obtuse, base cordate. Flowers axillary, solitary, or by reduction of the upper leaves becoming racemosely arranged. Calyx 1 to 1.3 cm long, the lobes acuminate, hastate at the base, green, villous. Corolla pale-blue, the limb about 1.5 cm in diameter, the lobes acuminate. Staminal-cone woolly on the back. Fruit enclosed by the calyx, the nutlets about 5 mm long, their inner faces rugose.

In waste places, cultivated lands, etc., occasional, fl. July–Jan.; local in the Philippines and undoubtedly introduced. India to Persia and Mauritius.

2. T. ZEYLANICUM (L.) R. Br.

An erect, branched, pubescent and hirsute, annual herb 30 to 70 cm high. Leaves oblong to lanceolate, 5 to 12 cm long, shortly petioled, narrowed at the acute base, obtuse to slightly acuminate, the upper ones much reduced, bristly-hairy, the hairs springing from tubercles on the upper surface, the lower surface pubescent and with longer hairs on the nerves. Flowers long-pedicelled, in axillary and terminal racemes forming a leafy panicle. Calyx densely pubescent, about 1 cm long in flower, the sepals increasing in size and surrounding fruit, rounded or acute at the base, acuminate. Corolla pale-blue, about 1.3 cm in diameter.

Occasional in open waste places, fallow lands, etc., fl. March–June; widely distributed in Luzon, but certainly introduced here. India to the Mascarene Islands through Malaya to Australia.

6. COLDENIA Linnaeus

Prostrate scabrous herbs with alternate, crisped leaves. Flowers small, axillary, sessile, solitary, or the upper ones in a short, one-sided, leafy spike. Sepals 4 or 5. Corolla-tube short, the lobes 4 or 5, spreading, imbricate in bud. Stamens as many as the corolla-lobes, inserted on the tube. Ovary 2-celled, cells 2-ovuled, or nearly 4-celled. Style terminal, bifid. Fruit nearly dry, of 4, subconnate, 1-seeded pyrenes. (In honor of C. Colden, lieutenant-governor of New York, a correspondent of Linnaeus.)

Species about 11, all tropical American, except the following widely distributed one.

1. C. PROCUMBENS L.

An annual, pubescent herb, the branches procumbent, spreading flat on the ground, up to 25 cm in length. Leaves elliptic to oblong-obovate, the nerves deeply impressed, obtuse, coarsely crenate, base very strongly inequilateral, 1.5 to 2.5 cm long. Flowers white, small. Pyrenes slightly muricate, subconnate into an acute, 4-ribbed, conical fruit 3 to 4 mm in diameter.

In open dry waste places, La Loma, fl. Dec.–Feb.; widely distributed in the Philippines, but of local occurrence in and about towns, and certainly introduced. All tropical countries; probably a native of tropical America.

121. VERBENACEAE (VERBENA OR MOLAVE FAMILY)

Herbs, vines, shrubs, or trees, with opposite, simple or digitate leaves, the stipules none. Inflorescence axillary or terminal, spicate, racemose or cymose, the cymes often arranged in panicles, the bracts small to large. Calyx sometimes accrescent, 4- or 5-toothed or truncate, teeth rarely more numerous. Corolla-tube long or short, usually cylindric, the limb 2-lipped or subequally 4- or 5-, rarely many-lobed. Stamens 4, in 2 unequal pairs, sometimes equal and 5 or 6 or more. Ovary superior, free, usually of 2 carpels, 2- to 8-celled or sub-1-celled, entire or 4-lobed. Fruit drupaceous or capsular, 1- to 4-celled, the cells 1-seeded.

Genera 77, species about 900, chiefly tropical, in both hemispheres, 15 genera and about 90 species in the Philippines.

1. Inflorescence spicate, the lower flowers opening first, spikes solitary or cymosely panicled.
    2. Trees or shrubs of muddy seashores with small, densely arranged flowers and rather large capsular fruits, the valves thick, leathery. 1. *Avicennia*
    2. Prickly aromatic shrubs with fleshy fruits.................... 2. *Lantana*
    2. Prostrate spreading herbs with dense short spikes.................... 3. *Lippia*
    2. Erect branched herbs with much-elongated, slender spikes of blue flowers.................... 4. *Stachytarpheta*
1. Inflorescence racemose, the lower flowers opening first.
    2. Ovary 8-celled; calyx not enlarged; fruit fleshy.................... 5. *Duranta*
    2. Ovary 2-celled; calyx lobes elongated, spreading and persistent in fruit; fruit a capsule, included in the calyx-tube.................... 6. *Petraea*
1. Inflorescence cymose or panicled, not spicate or racemose.
    2. Flowers in 6- to 9-flowered involucrate heads, the heads in terminal panicles.................... 7. *Symphorema*
    2. Flowers not involucrate.
        3. Corolla regular or subregular, not 2-lipped.
            4. Corolla 4-merous, regular; flowers small, in many-flowered axillary cymes.................... 8. *Callicarpa*
            4. Corolla 5-merous, usually elongated, often large and showy, in terminal, rarely axillary, cymose panicles.................... 9. *Clerodendron*
        3. Corolla 2-lipped.
            4. Flowers small, in our species greenish, white, or blue.
                5. Leaves 3- to 5-foliolate; flowers blue.................... 10. *Vitex*
                5. Leaves simple; flowers greenish or white.................... 11. *Premna*
            4. Flowers large, yellow, subtended by large bracts, in narrow, subracemose, panicled cymes.................... 12. *Gmelina*

1. AVICENNIA Linnaeus

Shrubs or trees of the mangrove swamps or along tidal streams. Leaves opposite, coriaceous, entire, pale. Inflorescence terminal or in the upper axils, of contracted peduncled cymes or heads, or these sometimes arranged in a trichotomous corymb. Flowers small. Calyx 5-parted, the segments imbricate. Corolla-tube short, the limb spreading, 4-lobed. Stamens 4, inserted on the corolla-throat. Ovary imperfectly 4-celled, 4-ovuled, the ovules pendulous. Fruit a somewhat fleshy capsule, dehiscing by 2 thick valves, 1-seeded. (Latin form of Abu Ben Sina, a celebrated Arabian physician.)

Species 3, tropical seashores of both hemispheres, 1 or 2 in the Philippines.

1. A. officinalis L. Apiapi, Bungalon, Pipisic (Tag.).

A shrub or tree reaching a height of 8 m, often flowering when less than 1 m high. Leaves oblong-obovate to elliptic, apex obtuse or rounded, base narrowed, acute, coriaceous, 4 to 10 cm long, the upper surface shining, the lower white or pale-grayish. Flowers yellow, densely crowded, the few-flowered heads 1 cm in diameter or less, the heads peduncled, solitary to cymosely arranged. Corolla about 5 mm long, pubescent or nearly glabrous. Capsule ovoid, pointed, pubescent, up to 2.5 cm in length. (Fl. Filip. *pl. 73.*)

Along tidal streams, common, fl. Apr.–Aug.; throughout the Philippines along the seashore. East Africa to tropical Asia through Malaya to New Zealand and Polynesia.

2. LANTANA Linnaeus

Erect or subscandent aromatic shrubs, usually prickly, pubescent or scabrous. Leaves simple, crenate. Inflorescence axillary, the flowers in peduncled, ovoid to oblong, short heads or spike-like heads. Calyx small, thin, truncate or slightly toothed. Corolla-tube slender, cylindric, the lobes 4 or 5, spreading. Stamens 4, in 2 pairs, included. Ovary 2-celled, 2-ovuled. Fruit fleshy, containing 2, hard, 1-celled pyrenes. (An ancient name for one of the viburnums.)

Species about 40, chiefly in tropical America, a single introduced one in the Philippines.

1. L. CAMARA L.

An erect or subscandent, somewhat hairy, aromatic shrub, when erect usually 1 to 2 m high, when scandent twice as high. Leaves ovate, acuminate, toothed, 5 to 9 cm long. Flowers in peduncled many-flowered heads including the corollas 2 to 3.5 cm in diameter. Corollas pink, red, or yellow, about 1 cm long, the limb 6 to 7 mm wide. Fruits in an ovoid, 2 cm long head, on a thickened, fleshy receptacle, the individual ones ovoid, purple or black, fleshy, about 5 mm long. (Fl. Filip. *pl. 216.*)

In waste places, thickets, etc., abundant, fl. all the year; widely distributed and thoroughly naturalized in the Philippines. A native of tropical America, now found in most tropical countries.

3. LIPPIA Linnaeus

Prostrate herbaceous plants (in our species) with opposite toothed leaves. Flowers small, in peduncled, solitary, axillary, dense, ovoid or cylindric spikes, each subtended by a broad, ovate or obovate bract. Calyx small, 2-fid. Corolla-tube slender, the limb 2-lipped, spreading. Stamens 4, in 2 pairs, included. Fruit small, dry, separating into two 1-seeded pyrenes. (In honor of A. Lippi, a French traveler.)

Species about 90, mostly American, single one in the Philippines, certainly introduced.

1. L. NODIFLORA (L.) Rich.

A creeping, minutely strigose plant, the stems 15 to 90 cm long, branched and rooting at the nodes. Leaves nearly sessile, obovate, base wedge-shaped, entire, the margins in the upper one-half sharply toothed, apex obtuse or rounded, 1 to 2.5 cm long. Peduncles axillary, solitary, erect, 2 to 7 cm long. Spikes ovoid or cylindric, very dense, 1 to 2.5 cm long, about 6 mm in diameter. Corolla about 3 mm long, pink, the tube slender, the limb 2.5 mm wide or less, the spike flowering at the apex, as it lengthens.

Common in waste places, lawns, etc., fl. all the year; throughout the Philippines, certainly introduced. Tropics generally, probably originating in tropical America.

4. STACHYTARPHETA Vahl

Erect, branched, suffrutescent herbs. Leaves opposite or alternate, toothed. Spikes terminal, elongated, slender, the bracts long or short, bracteoles none. Flowers solitary in the axils of the bracts, half-immersed in the rachis of the spike. Calyx narrowly cylindric, 4- or 5-toothed. Corolla blue, the tube slender, cylindric, the limb spreading, oblique, 5-lobed. Stamens 2, included in the tube, 2 staminodes also present. Ovary 2-celled, cells 1-ovuled. Fruit included in the calyx, of 2, hard, elongated, 1-seeded pyrenes. (Greek "spike" and "thick.")

Species about 40 in tropical and subtropical America, 1 now widely spread in most tropical countries.

1. S. **JAMAICENSIS** (L.) Vahl (*S. indica* Vahl).

An erect, branched suffrutescent herb 1 to 1.5 m high, the stems terete, or the younger ones slightly angled. Leaves elliptic to oblong-ovate, acute, base decurrent on the petioles, 2.5 to 10 cm long, serrate, prominently reticulate. Spikes terminal, rather slender, 10 to 30 cm long, 3 to 4 mm thick, green, continuous. Calyx small, oblique, 4-toothed, the bracts lanceolate. Corolla deep-blue, about 1 cm long. Fruit enclosed in the calyx, closely appressed to and somewhat sunk in the rachis, oblong, smooth, about 4 mm long.

Common in waste places, borders of thickets, etc., fl. all the year; throughout the Philippines. A native of tropical America, now found in most tropical countries.

5. DURANTA Linnaeus

Erect, unarmed or spiny shrubs, with opposite or verticillate, toothed or entire leaves which are punctate beneath, the flowers blue or purplish, racemose, the racemes axillary or in terminal panicles. Calyx 5-toothed. Corolla somewhat salver-shaped, the tube longer than the calyx, the limb 5-fid, spreading, the lobes unequal, rounded. Stamens 4, in 2 pairs, included, the filaments short, inserted on the middle of the corolla-tube. Ovary 8-celled, cells 1-ovuled. Fruit fleshy, containing four 2-celled pyrenes. (In honor of C. Durante, an early Italian botanist.)

Species about 4, of tropical America, one introduced and cultivated in Manila.

*1. D. **REPENS** L. (*D. plumieri* Jacq.).

An unarmed, glabrous, erect shrub 2 to 3 m high, the branches often drooping. Leaves obovate-elliptic, 3 to 6 cm long, apex acute or rounded, base cuneate, margins toothed above the middle. Racemes axillary and forming terminal panicles, spreading, slender, up to 12 cm long, the flowers mostly on one side of the rachis. Flowers purplish-blue, about 1 cm long, the limb about 1 cm wide. Fruits fleshy, ovoid, yellowish-green, 7 to 8 mm long.

At present rare in cultivation, fl. all the year; introduced before 1880 from tropical America.

6. PETRAEA Linnaeus

Climbing shrubs, glabrous or pubescent, the leaves usually harsh. Leaves opposite, entire, coriaceous. Flowers blue or purplish, in terminal racemes. Calyx-tube short, with 5 spreading lobes which are persistent and increase in length after flowering, the throat with 5 teeth alternating with the lobes. Corolla-tube short, cylindric, the limb oblique, 5-fid. Stamens 4, in 2 pairs, included. Ovary 2-celled, cells 1-ovuled. Capsule indehiscent, included in the persistent calyx-tube, 2- or 1-seeded. (In honor of Lord Petre, an English patron of horticulture and botany.)

Species about 12 in tropical America, 1 introduced in the Philippines.

* 1. P. VOLUBILIS Jacq.

A climbing shrub reaching a length of 6 m or more, the younger parts and inflorescence pubescent. Leaves shortly petioled, ovate-elliptic to elliptic-oblong, scabrid, acute or acuminate, base narrowed, slightly cordate, 6 to 12 cm long. Racemes solitary, pendulous, up to 30 cm in length, the pedicels usually much longer than the pubescent calyx-tube. Flowers blue~~, the~~ calyx-lobes narrowly-oblong, spreading, obtuse, about 2 cm long, 5 mm wide, persistent.

Somewhat cultivated, but not spontaneous, fl. Nov.–Mar. A native of Central America and the West Indies, of comparatively recent introduction in the Philippines.

7. SYMPHOREMA Roxburgh

Climbing shrubs with opposite entire leaves. Flowers in peduncled 6- to 9-flowered involucrate heads, the heads peduncled, in terminal panicles, the involucral bracts about 6, colored, enlarged and persistent in fruit. Calyx oblong-obovoid or narrowly funnel-shaped, 4- to 8-toothed. Corolla-tube a little longer than the calyx, cylindric, usually 6-lobed. Stamens as many or twice as many as the corolla-lobes. Ovary 2-celled, 4-ovuled; style filiform. Fruit nearly dry, included in the calyx, 1-seeded. (Greek "to bear together," from the crowded involucrate flowers.)

Species 3, 2 in India and 1 in the Philippines.

1. **S. luzonicum** (Blanco) F.-Vill.

A nearly glabrous woody vine 3 to 12 m in length. Leaves oblong to elliptic-oblong, 8 to 15 cm long, coriaceous, short-petioled, base usually rounded, apex acute or obtuse. Panicles somewhat pubescent, 8 to 30 cm long, the peduncles bearing the heads opposite, 2 to 6 cm long. Bracts pale-lavender or white, 2 to 4 cm long, spreading, oblong-elliptic, petioled. Calyx green, about 8 mm long, 6-toothed, pubescent outside, hirsute within. Corolla blue, 5- or 6-lobed, the lobes about 3 mm long. Stamens about twice as many as the corolla-lobes.

In dry thickets Masambong to Fort McKinley, fl. Apr.–May; widely distributed in the Philippines. Endemic.

8. CALLICARPA Linnaeus

Shrubs or small trees, the younger parts, the leaves, and the inflorescence stellate-pubescent, often densely so. Leaves opposite, toothed, often waxy-glandular beneath. Cymes axillary, shorter than the leaves, the bracts small. Calyx small, cup-shaped or campanulate, slightly 4-toothed, not enlarged in fruit. Corolla purplish or lavender, tubular, nearly symmetrical, the lobes 4, spreading. Stamens 4, exserted. Ovary imperfectly 2-celled, cells 2-ovuled. Fruit a small, globose, usually purplish or lavender drupe. (Greek "beauty" and "fruit.")

Species about 40, mostly in south-eastern Asia, Malaya, and northern Australia, a few in Polynesia and tropical America, about 25 in the Philippines.

Leaves densely stellate-pubescent beneath, the indumentum pale and quite covering the surface, the upper surface dark-colored when dry. 1. *C. cana*

Indumentum scattered, not entirely obscuring the lower surface, both surfaces of about the same color when dry .... 2. *C. blancoi*

1. **C. cana** L. (*C. bicolor* Juss.). Tambabasi, Tubang-dalag (Tag.).

A shrub 2 to 4 m high, the young branches, inflorescences, petioles, and lower surface of the leaves densely covered with short, grayish or whitish, stellately arranged hairs. Leaves oblong-ovate, acuminate, base acute or acuminate, margin sharply toothed, 6 to 14 cm long, 2.5 to 5 cm wide, the lower surface pale, the upper glabrous, green, dark-colored when dry. Cymes axillary, short-peduncled, dichotomous, 2 to 4 cm long. Flowers pale-purplish or lavender, about 3 mm long. Fruits fleshy, globose, pale-lavender, 4 to 5 mm in diameter when fresh.

In thickets, Masambong, fl. June–Oct.; widely distributed in the Philippines. Malay Peninsula and Archipelago.

2. **C. blancoi** Rolfe. Tambabasi, Tubang-dalag (Tag.).

A shrub 1 to 3 m high, the younger parts thinly or densely covered with short, stellately arranged, brownish or pale hairs. Leaves ovate-lanceolate to oblong-lanceolate, slenderly long-acuminate, base acute or obtuse, 5 to 15 cm long, of about the same color on both surfaces when dry, the lower surface thinly stellate-pubescent and with numerous, small, waxy, yellow glands. Inflorescence and flowers as in the preceding species. (Fl. Filip. *Pl. 417, C. americana.*)

In dry thickets Masambong to Guadalupe, fl. March–Oct.; widely distributed in the Philippines. Formosa.

9. CLERODENDRON Linnaeus

Shrubs or trees, sometimes climbing. Leaves opposite, simple, entire or toothed. Cymes axillary and forming terminal panicles, the bracts small or large. Calyx campanulate, truncate, toothed, or lobed, persistent, often enlarged and colored in fruit. Corolla-tube slender, cylindric, often very long, the limb spreading, 5-fid, more or less oblique. Stamens 4, exserted. Ovary imperfectly 4-celled, 4-ovuled. Fruit a globose, fleshy drupe, rarely nearly or quite dry, 4-grooved, and separating into 4 pyrenes, 1 to 3 of which are often suppressed. (Greek "chance" and "tree," the application of the name not evident.)

Species about 100 in the tropics of both hemispheres, mostly in the Old World, about 25 in the Philippines.

1. A slender vine; calyx-lobes white; corolla-lobes red; cultivated. 1. *C. thomsonae*
1. Erect undershrubs, shrubs, or small trees.
  2. Corolla-tube 5 cm long or more.
    3. Calyx in flower about 2.5 cm long, inflated.................. 2. *C. minahassae*
    3. Calyx in flower about 1 cm long, not inflated.... 3. *C. quadriloculare*
  2. Corolla-tube 1 to 3.5 cm long.
    3. Inflorencesce mostly terminal.
      4. Cymes very dense; flowers white or pink, double, 3 to 5 cm in diameter.. 4. *C. fragrans*
      4. Cymes lax; flowers single, red, slender.................. 5. *C. intermedium*
    3. Inflorescence axillary.
      4. Leaves toothed; cultivated, sparingly pubescent plant, not or slightly branched.. 6. *C. calamatosum*
      4. Leaves entire, glabrous; peduncles mostly 3-flowered; fruit dry, splitting into 4 pyrenes.. 7. *C. commersonii*

* 1. **C. THOMPSONAE** Balfour.

A slender woody vine 2 to 5 m in length, the stems obscurely 4-angled. Leaves oblong, 6 to 10 cm long, acuminate, base 3-nerved, rounded. Cymes terminal and in the upper axils, 8 to 12 cm long, lax, forked. Calyx sharply angled, the tube very short, green, the lobes more or less spreading, white, broadly lanceolate, acuminate, the limb about 3 cm in diameter, persistent. Corolla-tube slender, greenish, 2 cm long, the limb spreading, dark-red 1.5 cm in diameter, the lobes elliptic. Stamens exserted, curled.

Frequently cultivated for ornamental purposes, fl. most of the year. A native of tropical Africa, now widely distributed in cultivation.

2. **C. minahassae** T. & B. Bagauac (Tag.).

A shrub 1.5 to 4 m high, glabrous throughout. Leaves oblong to elliptic-oblong, shortly acuminate, subentire or slightly toothed, 11 to 18 cm long, 5 to 9 cm wide, base rounded, the petioles 4 to 10 cm long. Flowers in terminal cymose panicles, fragrant. Calyx oblong-ovoid, inflated, at time of flowering green, about 2.5 cm long, 1 cm in diameter, enlarged in fruit. Corolla-tube slender, cylindric, 5 to 8 cm long, straw-colored or whitish, the lobes narrowly-oblong or linear-oblong, spreading, about 2.5 cm long. Filaments exserted, purple. Fruit fleshy, blue, subglobose, about 1 cm in diameter, the calyx thickened, red or purple, split into five, 2.5 to 3 cm long lobes, spreading when the fruit is mature. (Fl. Filip. *pl. 223, C. blancoi.*)

In thickets, San Pedro Macati, Masambong, etc., rather common, fl. July–Sept.; widely distributed in the Philippines. Celebes.

3. **C. quadriloculare** (Blanco) Merr. Bagauac (Tag.).

An erect, glabrous or nearly glabrous shrub or small tree 2 to 5 m high. Leaves oblong, 15 to 20 cm long, apex shortly acuminate, base rounded, the upper surface green, the lower surface usually uniformly dark-purple. Cymes terminal, panicled, usually many-flowered. Calyx urceolate, purple about 1 cm long, 5-toothed. Corolla white, the tube slender, cylindric, 6 to 8 cm long, about 2 mm in diameter, the limb spreading, the lobes oblong-elliptic, about 1.5 cm long. Fruit ellipsoid, 1 to 1.5 cm long, purplish, the persistent calyx red and 1 to 1.5 cm long. (Fl. Filip. *pl. 225, C. longiflorum.*)

Cultivated for its ornamental foliage and its showy flowers, fl. Nov.–Jan.; widely distributed in the Philippines in forests, apparently endemic.

* 4. **C. FRAGRANS** Vent.

An erect, branched, somewhat pubescent shrub, 1 to 2 m high. Leaves broadly ovate, acute, base truncate, up to 25 cm in length. Cymes short-peduncled, terminal, densely many-flowered, 6 to 12 cm in diameter. Flowers fragrant, the pedicels 1 to 2 cm long. Calyx-tube rather slender below, enlarged above, the lobes 5 or 6, reddish-purple, lanceolate, acuminate, about 1.5 cm long. Corolla white, 3 to 3.5 cm in diameter the tube 1 to 1.5 cm long. (Fl. Filip. *pl. 222.*)

Frequently cultivated for ornamental purposes, fl. most of the year. A native of China, now cultivated in many tropical countries. I have seen only the double-flowered variety in the Philippnes.

5. **C. intermedium** Cham. Casopanguil (Tag.).

An erect, branched, shrubby or suffrutescent plant 1 to 2 m high, the stems green, 4-angled. Leaves ovate, 9 to 20 cm long, acuminate, base prominently cordate, margins shallowly toothed, the lower surface with numerous, small but prominent glands. Panicles 25 cm long or less, terminal and in the upper axils, the whole inflorescence bright-red. Flowers odorless, slender, the corolla-tube about 1 cm long, the limb spreading, somewhat oblique, subequally 5-lobed, 1.5 cm in diameter, the lobes oblong, obtuse. Stamens deflexed or ultimately recurved, exserted about 2 cm, red or purplish. Fruit depressed-globose, fleshy, blue, about 1 cm in diameter, containing 3 or 4 seeds, the accrescent calyx red, spreading or reflexed, about 2 cm in diameter. (Fl. Filip. *pl. 173.*)

In open waste places, often in rather wet soil, fl. July-Nov.; common and widely distributed in the Philippines. Endemic, but with very closely allied and perhaps identical forms in Formosa and Celebes.

6. C. CALAMATOSUM L.

An erect, shrubby or suffrutescent plant 1 to 2 m. high, sparingly pubescent. Leaves elliptic to oblong-elliptic, 4 to 10 cm long, obtuse or subacute, base acute, margins rather coarsely toothed. Flowers in few-flowered cymes, in the upper axils, fragrant, white. Calyx 5 to 8 mm long, 5-cleft. Corolla slender, pubescent, about 3 cm long.

Occasionally cultivated for its fragrant flowers, fl. Oct.–Dec. A native of Java, introduced in the Philippines, and at least subspontaneous in some localities.

7. **C. commersonii** (Lam.) Spreng. (*C. neriifolium* Wall.).

An erect or somewhat scandent shrub 1 to 4 m high. Leaves ovate, oblong-ovate, or elliptic-ovate, shining, glabrous, entire, obtuse, acute, or slightly acuminate, 4 to 8 cm long, 2 to 5 cm wide. Peduncles axillary, mostly 3-flowered. Calyx green, narrowly funnel-shaped, truncate, with 5 very short teeth. Corolla about 3 cm long, the tube slender, white, the lobes spreading, about 7 mm long, tinged with purple. Stamens long-exserted, purple. Fruit obovoid, about 1.5 cm long, splitting into 4 pyrenes, the calyx in fruit about 1 cm in diameter. (Fl. Filip. *pl. 224. C. inerme.*)

In thickets along tidal streams subject to the influence of salt water, fl. at intervals all the year; throughout the Philippines in similar habitats. southern China to Malaya, Australia, and Polynesia.

10. VITEX Linnaeus

Shrubs or trees, rarely prostrate, glabrous or pubescent. Leaves opposite, digitately 3- or 5-foliolate, rarely simple. Inflorescence terminal and axillary, composed of paniculately arranged cymes. Flowers blue or yellow. Calyx short, campanulate, truncate or shortly 5-toothed. Corolla-tube cylindric, the limb 2-lipped, the central lobe of the lower lip much larger than the others. Stamens 4, in 2 pairs, exserted. Ovary 2- or 4-celled, 4-ovuled. Fruit a small globose or obovoid drupe, the calyx somewhat enlarged, persistent. (A name used by Pliny for one species, or some similar shrub.)

Species about 60 in most tropical and warm countries, 10 or less in the Philippines.

1. Trees; leaves 3-foliolate, the leaflets all stalked, glabrous.. 1. *V. parviflora*
1. Shrubs; leaves 1- to 5-foliolate, densely pubescent beneath.
   2. Leaflets usually 5, rarely 3, petioled, lanceolate to narrowly lanceolate. 2. *V. negundo*
   2. Leaflets 3 or 1, sessile, very pale beneath, oblong-ovate to ovate or obovate........ 3. *V. trifolia*

1. **V. parviflora** Juss. (*V. littoralis* Dcne.). Molauin, Molave (Tag.).

A tree with very hard wood, reaching a height of from 8 to 15 m, glabrous or nearly so, or the inflorescence puberulent. Leaflets 3, petioled, ovate to lanceolate, acuminate, 7 to 18 cm long, shining, quite glabrous. Inflorescence terminal, paniculate, ample, up to 20 cm long, usually somewhat pyramidal, many-flowered. Flowers blue, 6 to 8 mm long, the corolla pubescent outside. Fruit globose or subglobose, 5 to 6 mm in diameter. (Fl. Filip. *pl. 227*, *V. altissima.*)

In dry thickets Masambong, fl. May–Oct.; common and widely distributed in the Philippines. Timor.

2. **V. negundo** L. Lagundi (Tag.).

An erect branched shrub 2 to 5 m high. Leaves usually 5-foliolate, rarely with 3 leaflets only, the middle leaflets larger than the others and distinctly petioled; leaflets lanceolate, acuminate, entire, 4 to 10 cm long, pubescent beneath. Panicles terminal, many-flowered, pubescent, 10 to 20 cm long, additional axillary ones often present. Flowers blue, 6 to 7 mm long, the calyx pubescent. Fruit globose, about 4 mm in diameter. (Fl. Filip. *Pl. 228*, *V. bicolor.*)

In thickets etc., occasional, fl. all the year; common and widely distributed in the Philippines. Tropical Asia and Malaya.

3. **V. trifolia** L. Lagundi (Tag.).

A shrub 1 to 3 or 4 m high with simple and 3-foliolate leaves, sometimes prostrate or ascending. Leaflets all 3-foliolate, or some simple, or in the prostrate form (var. *ovata*) all simple, sessile, oblong, oblong-elliptic, acute, 4 to 7 cm long, 1.5 to 4 cm wide, glabrous and shining on the upper surface, beneath gray-puberulent. Panicles terminal, oblong, 5 to 10 cm long, often leafy at the base. Corolla pubescent, lavender to blue, the tube about 8 mm long, the larger central lobe of the lower lip with a white blotch at the base, the limb 12 mm in greatest diameter. Fruit globose, 4 to 5 mm in diameter. (Fl. Filip. *pl. 226.*)

In thickets along the Pasay beach, fl. most of the year; widely distributed in the Philippines along the seashore. India to Japan through Malaya to Australia.

11. PREMNA Linnaeus

Erect trees or shrubs, sometimes climbing, usually with a somewhat rank or aromatic odor when crushed. Leaves opposite, entire or toothed. Cymes corymbose or panicled, usually pubescent, ample, terminal and axillary, the bracts small. Flowers small, usually white or greenish, numerous, often polygamous. Calyx small, cup-shaped, subequal or obscurely 2-lipped, nearly entire, or 4- or 5-toothed. Corolla tubular, short, the throat hairy, the limb 2-lipped or 5- or 4-lobed. Stamens 4, in 2 pairs. Ovary 2- or 4-celled, cells 1-ovuled. Fruit a small fleshy drupe, the endocarp hard, bony. (Greek "stump" allusion to the short stems of some species.)

Species about 50, tropics of the Old World, 15 or more in the Philippines.

1. Erect shrubs or small trees.
    2. Leaves large, 10 to 20 cm long, uniformly and densely soft-pubescent on the lower surface.. 1. *P. odorata*
    2. Leaves of medium size, glabrous, or pubescent only on and near the nerves.

3. Leaves glabrous, shining, base rounded or cordate, up to 15 cm long; a sea coast plant.. 2. *P. integrifolia*
3. Leaves more or less pubescent, 10 cm long or less, base acute. 3. *P. nauseosa*

1. A climbing shrub.. 4. *P. subscandens*

1. **P. odorata** Blanco. (*P. vestita* Schauer). Alagao (Tag.).

A shrub or small tree 3 to 8 m high, softly pubescent, somewhat aromatic when crushed. Leaves ovate to broadly ovate, 10 to 20 cm long, base broad, rounded or somewhat cordate, apex acuminate, the lower surface densely pubescent. Inflorescence terminal, 8 to 20 cm in diameter. Flowers greenish-white or nearly white, 4 to 5 mm long. Fruit globose, fleshy, dark-purple, about 5 mm in diameter.

Common in our area, fl. all the year; widely distributed in the Philippines. Endemic.

2. **P. integrifolia** L. Alagao, Alagao-dagat (Tag.).

A glabrous shrub 1 to 4 m high. Leaves oblong to oblong-ovate, glossy, coriaceous, 7 to 14 cm long, 5 to 7 cm wide, base rounded or cordate, apex acute or obtuse. Cymes 10 cm in diameter or less, flat. Flowers greenish or greenish-white. Calyx obscurely 2-lipped, one lip 2-toothed, the other 3-toothed. Corolla greenish-white. Fruit globose, dark-purple, fleshy, about 4 mm in diameter.

In thickets along the Pasay beach, fl. most of the year; along the seashore throughout the Philippines. India, through Malaya to Australia.

3. **P. nauseosa** Blanco. Molauin-aso (Tag.).

A shrub or small tree, reaching a height of 10 m, somewhat pubescent, ultimately often nearly glabrous, the leaves with a rank odor when crushed or in drying. Leaves elliptic-ovate oblong-ovate, acuminate, base rounded or acute, 6 to 10 cm long, 3 to 6 mm wide. Cymes terminal, up to 5 cm long and 6 cm wide, rather dense. Calyx green, equally 4-toothed, 1 to 1.5 mm long. Corolla pale-green, 4 mm long, villous inside, the stamens white, exserted. Fruit globose, fleshy, dark-purple, 4 to 5 mm long. (Fl. Filip. *pl. 396, P. leucostoma.*)

In thickets, Pasay, San Pedro Macati, etc., fl. May–Sept.; common and widely distributed in the Philippines. Endemic.

4. **P. subscandens** Merr. Alagao-baguing (Tag.).

A climbing shrub reaching a length of from 3 to 5 m, the leaves, branchlets, and inflorescence rather softly pubescent, rank-scented in drying. Leaves ovate, thin, 6 to 10 cm long, entire, acuminate, base rounded or cordate. Cymes terminating the branches, 5 to 14 cm in diamter, rather dense, many-flowered, densely and softly pubescent. Flowers white or greenish. Calyx softly pubescent, 3 mm long, 5-toothed, often obscurely 2-lipped. Corolla about 5 mm long, one lip entire, the other coarsely 3-lobed.

In dry thickets near Fort McKinley, fl. Apr.–June; of local occurrence in the Philippines. Endemic.

12. GMELINA Linnaeus

Glabrous or pubescent, spiny or spineless shrubs or trees, with opposite, entire, toothed or lobed leaves. Inflorescence terminal, usually small, cymose or racemose, the flowers bracteate. Flowers large, yellow.

Calyx campanulate, shortly 5-toothed or subtruncate. Corolla-tube slender, irregularly inflated upward, the limb oblique, 4-lobed. Stamens 4, in 2 pairs; anther-cells oblong, pendulous. Ovary 4-celled, 4-ovuled. Fruit a fleshy drupe, the endocarp hard, 4- or 2-celled, the calyx persistent, unaltered. (In honor of S. Gmelin, an early German naturalist.)

Species about 8, Asia to Australia, 2 or 3 in the Philippines.

1. **G. philippensis** Cham.

An erect, branched, nearly glabrous shrub or small tree 3 to 8 m high, usually with few stout spines on the trunk and branches. Leaves elliptic, 4 to 8 cm long, entire, apex usually rounded or obtuse, base acute. Flowers in short, terminal racemes, each subtended by a large, pale-green bract. Calyx green, about 5 mm long, truncate or obscurely denticulate. Corolla yellow, about 4 cm long. Fruit fleshy, yellow, pear-shaped, about 2 cm long, glabrous. (Fl. Filip. *pl. 215, G. asiatica.*)

In thickets Pasay, Masambong, etc., fl. Feb.–Oct.; widely distributed in the Philippines. Siam and Tenasserim.

122. LABIATAE (MINT OR CABLIN FAMILY)

Mostly herbs, rarely shrubs, aromatic or not, usually with 4-angled stems or branches. Leaves opposite or whorled. Flowers irregular, solitary, in pairs, or fascicled and axillary, or in lax or dense whorls arranged in spicate or racemose inflorescences, sometimes panicled or in dense heads. Calyx 4- or 5-cleft or -toothed or 2-lipped. Corolla-tube various, the limb 4- or 5-lobed or 2-lipped. Stamens 4, in 2 pairs, or the upper 2 imperfect, inserted in the corolla-tube. Ovary free, 4-lobed, 4-celled, the cells 1-ovuled. Fruit of four dry or somewhat fleshy 1-seeded nutlets at the base of the calyx.

Genera 164, species about 3,200, chiefly in the north temperate regions; 22 genera and about 50 species in the Philippines.

1. Fertile stamens 2; undershrubs with linear sessile leaves, the margins strongly recurved; cultivated only.......... 1. *Rosmarinus*
1. Stamens 4, rarely 2.
  2. Stamens bent downward.
    3. Lower corolla-lobe flat or nearly so, broad-based, spreading.
      4. Stamens exserted; very aromatic herbs or undershrubs.. 2. *Ocimun*
      4. Stamens included, a not or but slightly aromatic herb. 3. *Moschosma*
    3. Lower corolla-lobe boat-shaped or concave, base narrow, deflexed.
      4. Calyx-limb subequally 5-toothed, the lowest corolla-lobe not much longer than the others; filaments free; inflorescence capitate, spicate, or paniculate.......... 4. *Hyptis*
      4. Calyx-limb 2 lipped; lowest corolla-lobe boat-shaped, much longer than the others; filaments connate in a sheath surrounding the style; inflorescence lax.......... 5. *Coleus*
  2. Stamens not bent downward, spreading, free.
    3. Anthers 1-celled; filaments bearded; rather coarse, erect herbs. 6. *Pogostemon*
    3. Anthers 2-celled; filaments not boarded; prostrate spreading herbs. 7. *Mentha*
  2. Stamens ascending under the upper lip of the corolla.
    3. Upper lip of the corolla short, nearly flat; anthers dimorphous; coarse erect herbs.......... 8. *Anisomeles*

3. Upper lip of the corolla arched or hooded over the stamens; anthers uniform.
    4. Calyx-teeth 6 to 10, the tube ribbed, the mouth often oblique; upper lip of the corolla densely woolly outside; flowers white; low herbs.. 9. *Leucas*
    4. Calyx-teeth 5; upper lip of the corolla pubescent, but not woolly; flowers purplish; coarse erect herbs........................ 10. *Leonurus*

1. ROSMARINUS Linnaeus

An erect, much-branched, aromatic undershrub. Leaves sessile, linear. Flowers small, in short, axillary and terminal racemes. Calyx 2-lipped, the upper lip entire, the lower one bifid. Corolla exserted, the throat somewhat inflated, the upper lip erect, emarginate, the lower one spreading, trifid, the middle lobe large, concave. Stamens 2, ascending, exserted, under the upper lip. (Latin "dew" and "sea.")

A monotypic European genus.

*1. R. OFFICINALIS L. Romero (Sp.); Rosemary.

An erect undershrub 1 m high or less, the branches and leaves densely arranged. Leaves linear, sessile, entire, the margins strongly revolute, the lower surface gray-pubescent, 1 to 3 cm long. Racemes 1 to 3 cm long, the bracts shorter than the calyx. Flowers less than 1 cm long, blueish. (Fl. Filip. *pl. 94.*)

Quite extensively cultivated in Parañaque, the living plants sold in Manila; in cultivation many towns in the Philippines. Introduced from Spain at an early date, but not spontaneous here.

2. OCIMUM Linnaeus

Erect, branched, aromatic herbs or small shrubs. Leaves ovate, entire or toothed. Inflorescence of solitary or panicled, interrupted racemes, the flowers arranged in whorls, the pedicels short, spreading or recurved, Flowers small. Calyx deflexed in fruit, the upper lobe broad, the margins decurrent, the lower 2 acuminate, the lateral ones shorter than the lower ones. Corolla slender, more or less exserted, 2-lobed, the upper lip broader, subequally 4-fid, the lower entire. Stamens exserted, declinate. Nutlets smooth or somewhat rugose. (From an old Greek name.)

Species about 40, chiefly in tropical Asia, 2 or more in the Philippines.

Fruiting calyx strongly reflexed, the upper lobe orbicular; pedicels shorter than the calyx.. 1. *O. basilicum*
Fruiting calyx spreading or slightly reflexed, the upper lobe oblong-ovate; pedicels much longer than the calyx........................ 2. *O. sanctum*

1. O. BASILICUM L. Solasi (Tag.); Bonac, Caloy (Vis.).

An erect, branched undershrub 0.5 to 1.5 m high, glabrous or somewhat pubescent, very aromatic. Leaves ovate to oblong-ovate, entire or slightly toothed, acute, 1.5 to 3 cm long. Racemes 8 to 15 cm long, usually purplish, the pedicels short. Calyx strongly reflexed in fruit, the upper lobe orbicular, the lower two narrow lanceolate, acuminate, the lateral ones ovate. Corolla exserted, pink or purplish, 9 to 10 mm long.

Occasionally cultivated, fl. all the year; generally cultivated in the Philippines, but certainly not a native species. Tropical Asia and Africa through Malaya to Polynesia, in many places, however, only in cultivation. (Fl. Filip. *pl. 407.*)

2. O. SANCTUM L. **Albahaca (Sp.–Fil.); Solasi, Balanoi (Tag.); Colocogo, Camange (Vis.); Biday (Il.).**

An erect, herbaceous or suffrutescent, branched plant 1 m high or less, the stems and younger parts pubescent with spreading hairs. Leaves oblong-ovate, obtuse or acute, somewhat toothed, 2 to 4.5 cm long. Racemes 5 to 14 cm long, sometimes panicled. Pedicels about as long as the calyx, spreading, curved. Calyx at time of flowering about 3 mm long, somewhat larger in fruit, the two lower teeth long-awned, the upper one broadly oblong, the lateral ones very broad, mucronate. Corolla pink or purplish, but little longer than the calyx. (Fl Filip. *pl. 257.*)

Cultivated for its very fragrant leaves, occasionally also spontaneous in waste places, fl. Dec.–Feb.; throughout the Philippines, but certainly not a native of the Archipelago. Western Asia to Malaya, Australia, and Polynesia.

3. MOSCHOSMA Bentham

Annual or perennial, erect, branched herbs. Leaves petioled, ovate to oblong-ovate, thin, toothed or entire. Inflorescence axillary and terminal, of rather slender, panicled racemes, the whorls few-flowered. Flowers very small. Calyx ovoid, 5-toothed, the upper 3 teeth the largest, margins not decurrent. Corolla-tube very short, the upper lip shortly 4-fid. Stamens 4, declinate, the filaments free. Nutlets compressed, smooth. (From the musk-like odor of some of the species.)

Species about 6, tropics of the Old World, 1 in the Philippines.

1. M. TENUIFLORUM (Burn.) Heynh. (*M. polystachyum* Benth.).

An erect, much-branched, nearly glabrous herb 40 to 90 cm high, the stems prominently 4-angled. Leaves long-petioled, thin, ovate to oblong-ovate, acuminate, toothed, 2 to 6 cm long, the base acute. Racemes 3 to 10 cm long, 5 to 6 mm in diameter, densely many-flowered. Pedicels shorter than the calyx. Flowers lilac or pink, about 2.5 mm long, the calyx in fruit spreading or somewhat reflexed, 3 to 3.5 mm long.

In open places, occasional, fl. Dec.–June; widely distributed in the Philippines about towns, but certainly not indigenous. Tropical Africa and Asia through Malaya to Australia.

4. HYPTIS Jacquin

Erect, branched, aromatic or not. Leaves opposite, toothed. Inflorescence various, capitate, in dense spikes, or in remote, few-flowered, paniculate clusters. Calyx straight or oblique, 5-lobed, lobes acute or awn-tipped. Corolla 2-lipped, the lower lip abruptly deflexed, saccate. Stamens 4, declinate. Nutlets various. (From the Greek "laid back" and "under," in reference to the deflexed lower corolla-lip.)

A large genus of over 250 species, all American, a few now distributed as tropical weeds, 4 in the Philippines.

1. Strongly aromatic herbs, the flowers in few-flowered, racemosely disposed clusters .... 1. *H. suaveolens*
1. Not or but slightly aromatic; heads axillary or terminal, solitary, subglobose to oblong, densely many-flowered.
  2. Heads axillary, subglobose.
    3. Heads very shortly peduncled, peduncles not longer than the heads. 2. *H. brevipes*
    3. Heads long-peduncled, the peduncles many times as long as the heads. 3. *H. capitata*
  2. Heads terminal, oblong .... 4. *H. spicigera*

1. **H. suaveolens** (L.) Poir. Soob-cabayo (Tag.).

A coarse, erect, branched, more or less hairy, aromatic annual 0.5 to 2 m high. Leaves ovate, acute, serrulate, 4 to 9 cm long, variable. Flowers in axillary, peduncled, 3- to 4-flowered heads or clusters, some solitary ones usually added, racemosely or subpaniculately disposed along the branches. Calyx in flower about 4 mm long, soon enlarged and nearly 1 cm long, striate, villous, the teeth erect, subulate. Corolla blue, about 8 mm long, limb 5 mm in diameter.

In waste places, very abundant, fl. all the year. A native of tropical America, now found throughout the Philippines, and in some parts of India and Malaya.

2. **H. brevipes** Poir.

An erect, branched, somewhat hairy, annual herb 0.6 to 1.5 m high. Leaves oblong-ovate to oblong-lanceolate, acute or acuminate, serrate, 3 to 7 cm long. Heads globose, axillary, solitary, 1 to 1.3 cm in diameter, the peduncles as long as the heads or shorter. Flowers very numerous, calyx and bracts green, the teeth erect, subulate, corolla slightly exserted, white. (Fl. Filip. *pl. 204.*)

In open, usually damp or wet waste places and grass lands, fl. Oct.–Feb.; common and widely distributed in the Philippines, A native of tropical America, now naturalized in Malaya, tropical Africa, etc.

3. **H. capitata** Jacq.

A stout, erect, non-aromatic, annual herb 0.5 to 1.5 m high, more or less hairy, the stem green or purplish, 4-angled. Leaves lanceolate, toothed, 8 to 14 cm long. Flowers numerous, crowded in long-peduncled, axillary, solitary, globose heads, the peduncles up to 10 cm in length, the heads 1 to 2 cm in diameter, with a basal involucre of hairy bracts. Calyx green, 4 mm long, accrescent and 8 mm long in fruit. Corolla white, 6 mm long. (Fl. Filip. *pl. 294.*)

In open waste places, fl. Oct.–Feb.; common and widely distributed in the Philippines. A native of tropical America, not as yet reported from any other part of the Orient.

4. **H. spicigera** Lam.

An erect, branched, nearly glabrous or slightly pubescent annual herb 1 to 1.5 m high, the stems 4-angled, scabrous. Leaves petioled, lanceolate to oblong-lanceolate, acuminate, serrate, 2 to 6 cm long, the base acuminate-decurrent. Spikes oblong to ovoid, dense, terminating the branches, 2 to 6 cm long, many-flowered. Flowers purplish, 3 to 4 mm long. Calyx accrescent and about 6 mm long in fruit, ribbed, reticulate, the teeth subulate.

In open dry grass lands near Fort McKinley, fl. Oct.–Jan.; widely distributed in the Philippines. A native of tropical America.

5. COLEUS Loureiro.

Erect or spreading herbs or undershrubs, sometimes aromatic, often with variegated leaves. Leaves petioled, ovate, toothed. Flowers blue or purple, in lax, few- to many-flowered cymes (whorls) which are arranged in simple or panicled racemes. Calyx 5-toothed, 2-lipped, enlarged in fruit. Corolla exserted, decurved, the limb prominently 2-lipped, the lower lip much larger than the upper one, boat-shaped. Stamens declinate, the filaments united below into a sheath surrounding the style. (Greek "sheath," from the united filaments.)

Species 50 or more in tropical Africa, Asia, and Malaya, 7 or more in the Philippines.

1. Flowers minute, less than 5 mm long; a very aromatic plant, green throughout, cultivated only .... 1. *C. amboinicus*
1. Flowers about 1 cm long; plants slightly aromatic or nearly odorless, variously colored.
    2. Leaves 5 to 10 cm long, variously and prominently colored; cultivated only .... 2. *C. blumei*
    2. Leaves 1.5 to 3.5 cm long, slightly colored or nearly green. 3. *C. pumilus*

*1. C. AMBOINICUS Lour. (*C. aromaticus* Benth., *C. suganda* Blanco). Suganda (Tag.); Orégano (Sp.-Fil.)

An erect or spreading, branched, rather coarse, strongly aromatic herb, green, the stems fleshy. Leaves broadly ovate, crenate, fleshy, rounded or obtuse, base decurrent, often cordate, 4 to 9 cm long, somewhat villous. Flowers small, in distant, many-flowered whorls. Calyx-throat glabrous inside, the upper lip ovate, acute, thin, the lower acuminate. Corolla pale-purplish, with a short tube, the throat inflated, the lips short.

Occasionally cultivated for its very aromatic leaves, very rarely flowering; occasional in cultivation in the Philippines, introduced, origin uncertain. Cultivated, India to Malaya, and in various other tropical countries.

* 2. C. BLUMEI Benth. Mayana, Maliana (Tag., Vis., Pamp.).

An erect, branched, somewhat succulent, annual herb 1 m high or less, the leaves variously colored, usually more or less pubescent. Stems usually purplish, 4-angled. Leaves ovate, rather coarsely toothed, 5 to 10 cm long, in the most common form uniformly velvety-purple. Inflorescence terminal, simple or branched, 15 to 30 cm long. Flowers purplish, numerous, in lax verticils of cymes or racemes, the pedicels about 4 mm long. Calyx green, about 2.5 mm long, the upper lip ovate, obtuse, the lateral lobes short, ovate, the lower one 2-cleft. Corolla about 11 mm long. (Fl. Filip. *pl. 208.*)

Frequently cultivated, fl. Nov.–Mar. Generally cultivated in the Philippines for its ornamental foliage, but certainly introduced. India and Malaya, often only cultivated, and in cultivation in most warm countries.

3. **C. pumilus** Blanco (*C. gaudichaudii* Briq.).

A lax, erect or spreading, simple or somewhat branched herb 30 to 90 cm in length, the stems square, green, fleshy, usually decumbent below and rooting at the nodes. Leaves ovate to broadly ovate, 1.5 to 3.5 cm long, with scattered, long, weak hairs, acute or obtuse, base truncate, acute, or decurrent, margins coarsely dentate. Inflorescence a narrow terminal panicle, 8 to 20 cm long, rather lax, few or many flowers in each verticil. Flowers blue-purple, about 1 cm long, slightly glandular and hairy.

In thickets, Masambong, near Fort McKinley, etc., rarely also cultivated, fl. Nov.–Jan. Known only from Manila and vicinity.

6. POGOSTEMON Desfontaines

Erect, branched, mostly aromatic herbs or undershrubs. Leaves opposite, petioled, large. Flowers small, in axillary and terminal, simple or panicled spikes or contracted racemes, formed of many densely flowered cymes or whorls. Calyx nearly equally 4- or 5-toothed. Corolla-tube exserted or included, the limb somewhat 2-lipped, the lobes 4. Stamens 4, exserted, the filaments bearded. Style 2-fid. Nutlets ovoid or oblong, smooth. (Greek "beard" and "stamen.")

Species about 35, tropical Asia and Malaya, about 7 in the Philippines.

1. **P. cablin** (Blanco) Benth. Cablin, Cadling, Cadlom (Tag.); Patchouli.

An erect, branched, pubescent herb 0.5 to 1 m high, aromatic when crushed. Leaves ovate to oblong-ovate, acute or obtuse, 5 to 11 cm long, usually coarsely and doubly toothed or crenate. Spikes terminal and axillary, panicled, dense, sometimes interrupted, 2 to 8 cm long, 1 to 1.5 cm in diameter pubescent. Calyx about 6 mm long. Corolla pink-purple, 8 mm long, the lobes obtuse. Bracts about as long as the calyx.

Occasionally cultivated for its fragrant leaves, fl. Jan.–Feb.; in and about towns in Luzon and probably in other islands, cultivated and wild. India to Malaya, chiefly cultivated. This species yields the patchouli perfume of commerce.

7. MENTHA Linnaeus

Very aromatic perennial plants from prostrate rootstocks. Leaves ovate to oblong-ovate. Flowers small, in many-flowered whorls in axillary and terminal spikes. Calyx campanulate or tubular, 5-toothed, the throat naked or villous. Corolla subequally 4-lobed. Stamens 4, equal, erect. Nutlets smooth or reticulate. (From a Greek nymph of that name.).

Species about 25 in the north-temperate zone, introduced in many other regions, 2 in the Philippines.

*1. M. ARVENSIS L. Yerba buena (Sp.); Mint.

A prostrate, glabrous, or slightly hairy, strongly aromatic, much branched herb, the stems up to 40 cm long, usually purplish, the ultimate branches ascending. Leaves elliptic- to oblong-ovate, short-petioled, serrate, rounded or obtuse, 1.5 to 4 cm long. Flowers in axillary, capitate whorls, the calyx-teeth triangular or lanceolate, hairy, the corolla also hairy.

Commonly cultivated, but not spontaneous. Introduced from Europe and here rarely or never flowering; its natural range is from Europe through northern Asia to China.

8. ANISOMELES R. Brown

Coarse, erect, branched herbs. Flowers in axillary whorls, or the whorls arranged in stout, terminal, more or less interrupted racemes. Calyx ovoid, equally 5-toothed, straight. Corolla-tube short, the upper lip erect, entire, the lower broad, spreading, the middle lobe notched. Stamens exserted, the anthers conniving. Style equally 2-fid. Nutlets smooth. (Greek "unequal" and "members," in reference to the unequal corolla-lips.)

Species about 8, tropical Asia to Australia, 1 in the Philippines.

1. A. INDICA (L.) O. Kuntze (*A. ovata* R. Br.). Paling-harap (Tag.).

An erect, branched, annual herb 1 to 2 m high, more or less tomentose. Leaves ovate, long-petioled, thin, 3 to 12 cm long, acuminate, crenate or crenate-serrate. Whorls many-flowered, in dense or interrupted, stout, spike-like racemes, 5 to 25 cm long, 2 to 3 cm in diameter, the lower whorls in the leaf-axils. Calyx about 6 mm long, hairy, the teeth acuminate. Corolla purplish, 10 to 12 mm long.

In open waste places, San Juan del Monte, fl. Dec.–Feb.; widely distributed in the Philippines, but certainly not indigenous. India to China and Malaya.

9. LEUCAS R. Brown

Glabrous or pubescent, annual or perennial, simple or branched, erect or ascending herbs. Leaves narrow. Whorls axillary, usually distant. Calyx 10-nerved, the mouth oblique, equally or unequally 6- to 10-toothed. Corolla-tube included, annulate or not within, the upper lip short, erect, concave, villous, the lower spreading 3-fid, the middle lobe very large. Stamens 4, ascending; anthers conniving, cells divaricate, at length confluent. Style subulate. Nutlets ovoid, triquetrous, obtuse. (Greek "white," in reference to the white-pubescent leaves of some species.)

Species about 50 Africa, Asia, and Malaya, about 5 in the Philippines.

Leaves linear to linear-lanceolate.. 1. *L. lavendulifolia*
Leaves ovate.. 2. *L. javanica*

1. L. LAVENDULIFOLIA Smith (*L. linifolia* Spr.).

An annual, erect, branched herb 40 to 80 cm high, more or less pubescent with short hairs. Leaves linear to linear-lanceolate, 5 to 9 cm long, 8 to 13 mm wide, acuminate, base narrowed, somewhat toothed; petioles none or short. Whorls axillary and terminal, many-flowered, the bracts few, short. Calyx about 1 cm long, green, very oblique, sharply toothed. Corolla white, 1.5 cm long, the central lobe of the lower lip obovate, truncate, 8 mm wide.

In open dry grass lands, waste places, etc., fl. all the year; throughout the Philippines, but certainly not a native species. India to Mauritius and Malaya.

2. L. JAVANICA Benth.

An erect or ascending, branched, pubescent herb 20 to 50 cm high. Leaves ovate, 2 to 6 cm long, up to 4 cm in width, obtuse, base subtruncate or rounded, margins coarsely crenate. Flowers axillary, crowded, 10 to 50 in each verticil, the bracts linear-setaceous. Calyx green, pubescent, 8 to 9 mm long, striate, with 10, slender, subequal, linear-subulate teeth. Corolla white, 11 to 12 mm long, the upper lobe ciliate; the lower 3-lobed, glabrous.

In thickets and open places opposite Fort McKinley, fl. Sept.–Jan.; widely distributed in the Philippines, but probably not a native plant. Java.

10. LEONURUS Linnaeus

Erect, branched, leafy herbs with lobed leaves. Flowers in axillary, densely flowered, scattered whorls, or the upper ones closer, the bracts subulate. Calyx 5-nerved, turbinate, the teeth 5, spreading, spine-like. Corolla-tube naked within, the upper lip entire, erect, the lower 3-fid, the middle lobe obcordate. Stamens 4. Nutlets 3-angled, truncate, smooth. (From the Greek "lion" and "tail.")

Species 10 in Europe, Asia, and America, a single introduced one in the Philipipnes.

1. L. SIBIRICUS L.

A rather coarse, erect, branched, usually somewhat pubescent, annual herb 60 to 120 cm high. Leaves 5 to 10 cm long, pinnately or palmately 3- to many-parted, the lobes narrow, often incised, or the upper leaves entire, linear, pale beneath. Whorls numerous, densely-flowered, the bracts equaling the calyx. Calyx about 7 mm long. Corolla about 1 cm long, red. (Fl. Filip. *pl. 259.*)

Rare in our area, fl. Aug.–Jan.; of local occurrence in the Philippines, in waste places about towns, etc., undoubtedly an introduced plant in the Archipelago. Tropics generally.

123. SOLANACEAE (NIGHTSHADE OR TALONG FAMILY)

Herbs or shrubs, sometimes scandent, with alternate, simple or pinnate leaves, the leaves sometimes in unequal pairs, never opposite, the stipules none. Inflorescence lateral or terminal, axillary or extra-axillary, cymose, or clustered, the flowers sometimes solitary. Flowers perfect, regular or nearly so. Calyx inferior, 5-toothed or truncate, usually persistent in fruit, often enlarged. Corolla various, often plaited, the lobes 5. Stamens 5 (4 in 2 pairs in *Brunfelsia*), inserted on the corolla-tube. Ovary 2-celled or imperfectly 1- to 4-celled; ovules numerous. Fruit a dry or fleshy berry or capsular, usually 2-celled, many-seeded.

Genera 83, species over 2,000, in the warmer parts of the whole world, 7 genera and about 35 species known from the Philippines.

1. Flowers 2 cm long or more.
  2. Flowers very large, about 6 cm long; fruit a spiny capsule. 1. *Datura*
  2. Flowers much smaller; fruit not spiny.
    3. Shrubs.
      4. Flowers few, axillary or terminal; stamens 4, in 2 pairs. 2. *Brunfelsia*
      4. Flowers numerous in terminal and axillary corymbs; stamens 5. 3. *Cestrum*
    3. Erect coarse herbs.......... 4. *Nicotiana*
1. Flowers less than 2 cm in length.
  2. Anthers forming a cone surrounding the style, opening by two pores at the apex.
    3. Leaves simple.......... 5. *Solanum*
    3. Leaves pinnate or 2-pinnate.......... 6. *Lycopersicum*
  2. Anthers free, not forming a cone opening by longitudinal slits.
    3. Calyx in fruit small.......... 7. *Capsicum*
    3. Calyx in fruit much enlarged, inflated, thin, loosely surrounding the fruit.......... 8. *Physalis*

1. DATURA Linnaeus

Coarse, erect, branched, herbaceous or shrubby plants, usually rank-scented. Leaves large, sinuate, lobed, or entire. Flowers very large, pedicelled, axillary, solitary, white or purple. Calyx tubular, 5-toothed, the basal part persistent in fruit. Corolla long, tubular-funnel-shaped, the limb plaited, shortly lobed. Stamens attached near the base of the tube. Ovary 2- or 4-celled. Capsule spinous, globose, bursting irregularly, seated on the enlarged basal part of the calyx. Seeds very numerous, compressed, wrinkled. (Altered from the Arabian name "Tatorah.")

Species about 10 in temperate and tropical regions, 2 in the Philippines.

1. D. ALBA Nees. Talong-punay (Tag.).

A coarse, erect, branched, glabrous or slightly pubescent herb or short-lived shrub 0.5 to 2 m high. Leaves ovate to oblong-ovate, base inequilateral, apex acuminate, margins irregularly and shallowly lobed, 9 to 18 cm long. Flowers very large, axillary, solitary. Calyx green, about 6 cm long, cleft at the apex, and with linear teeth. Corolla white, about 15 cm long, the mouth about 8 cm in diameter, fruit globose, green, about 3.5 cm in diameter, covered with short, stout spines. (Fl. Filip. *pl. 34, D. metel.*)

In waste places, fl. all the year; widely distributed about towns in the Philippines, undoubtedly introduced. India to China and Malaya.

2. BRUNFELSIA Linnaeus

Erect, glabrous shrubs. Leaves entire, shining. Flowers terminal or axillary, solitary or in few-flowered cymes. Calyx tubular or campanulate, truncate or 5-toothed. Corolla salver-shaped, the tube long, straight or somewhat curved, the limb spreading, 5-lobed. Stamens 4, in 2 pairs, inserted on the tube, included. Ovary sessile, 2-celled; ovules numerous. Capsule subglobose, fleshy or leathery, the pericarp thick, sometimes scarcely dehiscent. (In honor of O. Brunfels, a Swiss botanist.)

Species about 20 in tropical America, 2 introduced and cultivated in the Philippines.

Flowers purple, 2 to 2.5 cm long, the corolla-tube not more than twice as long as the calyx .... 1. *B. acuminata*
Flowers white, becoming yellow, about 4.5 cm long, the corolla-tube very much longer than the calyx .... 2. *B. americana*

* 1. B. ACUMINATA (Pohl) Benth. Viola (Sp.–Fil.).

An erect, glabrous, branched shrub 1 m or more in height. Leaves oblong or elliptic-oblong, acuminate, base acute, short-petioled, 3 to 7 cm long. Flowers solitary, or in lax, few-flowered cymes, violet-purple. Calyx tubular, not inflated, about 12 mm long. Corolla-tube twice as long as the calyx or shorter, the limb about 2 cm in diameter.

Rarely cultivated, fl. Feb.–March, and probably in other months. A native of tropical America and of recent introduction in the Philippines.

* 2. B. AMERICANA L.

An erect glabrous shrub. Leaves somewhat crowded on the ultimate twigs often yellowish-green, oblong-ovate, acute or obtuse, firm, entire, base cuneate, 5 to 10 cm long. Flowers terminal, solitary or in pairs, shortly pedicelled, very fragrant. Calyx green, ovoid, 6 mm long, 5-toothed. Corolla-tube about 4.5 cm long, slender, somewhat straw-colored, the limb white, soon turning yellowish, oblique, subequally 5-lobed, about 5 cm in diameter. Fruit globose, about 1.5 cm in diameter, the pericarp yellow, somewhat fleshy, 2-valved; seeds numerous.

Occasional in cultivation, fl. all the year. A native of tropical America, and of recent introduction in the Philippines.

3. CESTRUM Linnaeus

Shrubs or small trees, with alternate, entire leaves. Flowers regular, in axillary and terminal racemes or corymbs. Calyx short, 5-toothed. Corolla elongated, slightly enlarged upward, 5-lobed, the lobes much shorter than the tube. Stamens 5, included, more or less adnate to the corolla-tube. Ovary ovate or globose, 2-celled, the ovules few; style simple. Fruit small, fleshy, 2-celled. (The ancient Greek name for betony.)

A large tropical American genus of 160 or more species, a single introduced one in the Philippines.

1. C. NOCTURNUM L. Dama de noche (Sp.-Fil.).

An erect or subscandent glabrous shrub usually 2 to 3 m high, with long, often drooping branches. Leaves oblong-ovate to oblong-lanceolate, 8 to 15 cm long, acuminate. Corymbs axillary and terminal, lax, 7 to 10 cm long. Flowers numerous, slender, yellowish-green, very fragrant at night, about 2.3 cm long. (Fl. Filip. *pl. 151.*)

Frequently cultivated for its very fragrant flowers, fl. at intervals throughout the year; in most towns in the Philippines, naturalized in some regions. A native of tropical America, introduced here at an early date.

4. NICOTIANA Linnaeus

Erect, viscid-pubescent herbs (in our species), with ample, entire or sinuate leaves. Panicles terminal, or subterminal, compound. Calyx ovoid, 5-fid. Corolla narrowly funnel-shaped, 5-lobed. Ovary 2-celled, many ovuled. Capsule 2-celled, 2-valved, the seeds very numerous, small. (From J. Nicot, a French ambassador to Portugal.)

Species about 35 in America, Polynesia, and Australia, the following introduced and cultivated here.

* 1. N. TABACUM L. Tabaco (Sp.); Tobacco.

A coarse, erect, annual herb 0.7 to 1.5 m high. Leaves elliptic-ovate to oblong or obovate, 10 to 30 cm long, the base narrowed, sessile or short-petioled. Calyx green, 1 to 1.5 cm long, enlarged in fruit. Corolla white and pink, about 5 cm long. Capsule ovoid, 1.5 to 2 cm long.

Rarely cultivated in the vicinity of Manila, fl. all the year; cultivated throughout the Philippines, in some provinces very extensively. A native of tropical America, introduced here at an early date; now cultivated in all warm countries. (Fl. Filip. *pl. 36.*)

5. SOLANUM Linnaeus

Annual or perennial herbs or shrubs, glabrous or stellate-pubescent, spinous or unarmed. Leaves opposite or alternate, entire or lobed. Inflorescence lateral or terminal, cymose or racemose. Calyx 5- or 10-lobed. Corolla-tube short, the limb 5-lobed. Stamens 4, the filaments short, the anthers connivent into a cone. Ovary 2-celled. Fruit a small or large, globose or elongated berry. (Derivation of name unknown.)

A very large genus with more than 700 species, chiefly in tropical and subtropical regions, 20 or more in the Philippines.

1. Unarmed herbs or shrubs.
    2. A shrub 1 to 4 m high, all parts densely stellate-pubescent; flowers in dense cymes, white........ 1. *S. verbascifolium*
    2. Herbs.
        3. A slender herb with white, umbellately arranged flowers and globose, black or dark-purple fruits 5 mm in diameter.... 2. *S. nigrum*
        3. A coarse herb cultivated only; flowers few, axillary, blue or purplish; fruit very large, 10 to 25 cm long........ 3. *S. melongena*

1. More or less spiny or prickly herbs or vines.
   2. Erect, stellate-pubescent, coarse herbs.
      3. Leaves with long, scattered spines.. 4. *S. cumingii*
      3. Leaves not spiny.. 5. *S. torvum*
   2. Scandent, glabrous or nearly so, stems and petioles more or less spiny or prickly.
      3. Flowers about 1.5 cm in diameter, in few-flowered racemes; leaves sinuate.. 6. *S. athroanthum*
      3. Flowers about 4 cm in diameter, in many-flowered cymes; leaves simple and entire, and pinnately lobed or pinnate on the same plant.. 7. *S. wendlandii*

1. **S. verbascifolium** L. Talong-aso, Malatalong, Malatabaco (Tag.).

A shrub 1 to 4 m high, all parts stellate-pubescent. Leaves ovate, oblong-ovate, or elliptic-ovate, 10 to 23 cm long, entire, acuminate, base acute or somewhat rounded, the lower surface pale and densely stellate-pubescent. Cymes terminal or subterminal, dichotomously compound, peduncled, rather densely flowered. Calyx grayish-green, about 5 mm long. Corolla white, often tinged with green, the lobes spreading, about 1.3 cm in diameter, pubescent outside. Fruit globose, fleshy, green or yellowish, nearly 1 cm in diameter. (Fl. Filip. *pl. 86.*)

In open dry lands, thickets, etc., fl. Aug.–Feb.; widely distributed in the Philippines. Tropical Asia to Australia, and tropical America.

2. S. NIGRUM L. Cunti (Tag.).

An erect, branched, glabrous or nearly glabrous herb, 1 m high or less. Stems green, somewhat 3-angled. Leaves ovate to oblong, petioled, 5 to 8 cm long, acuminate, base acute or acuminate, margins subentire or undulately toothed or lobed. Peduncles extra-axillary, 1 to 2.5 cm long, the flowers umbellately disposed, 5 to 8 on each peduncle, nodding. Calyx green, the lobes ovate-oblong. Corolla white, about 8 mm in diameter. Fruit a dark-purple or black, glabrous, globose, fleshy berry about 5 mm in diameter.

In waste places, occasional, fl. all the year; widely distributed in the Philippines, and probably introduced. All temperate and tropical countries.

*3. S. MELONGENA L. Talong (Tag.); Berenjena (Sp.); Egg Plant.

A coarse, usually branched, erect annual 0.4 to 1 m high, somewhat prickly or unarmed. Leaves ovate to oblong-ovate, stellate-pubescent beneath, irregularly and shallowly lobed, 10 to 25 cm long. Flowers axillary, about 2.5 cm long, purplish or bluish. Fruit fleshy, smooth, purple, up to 25 cm long, very variable in shape, globose to oblong or cylindric-oblong. (Fl. Filip. *pl. 265.*)

Cultivated for its edible friut, fl. more or less all the year. Not a native of the Philippines, its origin uncertain; cultivated in most tropical and temperate countries.

4. **S. cumingii** Dunal. Talangbulo, Tarambulo (Tag.).

A spreading or ascending, somewhat branched, stellate-pubescent herb 30 to 60 cm high. Stems, petioles, and leaves with scattered, sharp, rather stout spines, 3 to 6 mm long. Leaves oblong-ovate, acute or slightly acuminate, irregularly undulate-lobed, base inequilateral, 4 to 12 cm long, stellate-pubescent on both surfaces. Flowers in axillary, 1- to 5-flowered racemes. Calyx green, the tube slightly spiny. Corolla violet or purplish, rotate, shallowly 5-lobed, nearly 2 cm in diameter. Stamens yellow. Fruit globose, glabrous, 2.5 cm in diameter, green mottled with white, or yellowish, the accrescent calyx nearly 2 cm in diameter. (Fl. Filip. *pl. 49.*)

In waste places, occasional, fl. more or less all the year; widely distributed in the Philippines. An endemic species reduced by some authors to *Solanum melongena* L., of which it may be a wild form.

5. S. **TORVUM** Sw. Tandang-aso, Talampay (Tag.).

A coarse, erect, branched, suffrutescent herb 1 to 3 m high, the branches with short scattered spines, most parts stellate-pubescent. Leaves ovate to oblong-ovate, 10 to 20 cm long, sinuate-lobed, acuminate, base inequilateral. Inflorescence lateral, usually extra-axillary, racemose, often dichotomous. Flowers many, white, about 1 cm long. Fruit globose, yellow, glabrous, about 1 cm in diameter.

In waste places, occasional, fl. all the year; widely distributed about towns in the Philippines, undoubtedly introduced. Tropical America, tropical Asia, and Malaya.

* 6. S. **ATHROANTHUM** Dunal.

A slender, scandent, nearly glabrous vine about 2 m high, the branches and petioles armed with recurved spines. Leaves ovate to oblong-ovate, irregularly and coarsely sinuate, 2 to 5 cm long, apex rounded, base subtruncate, often inequilateral. Racemes lateral, few-flowered, about as long as the leaves. Flowers long-pedicelled, pale-blue, about 1.5 cm in diameter. Fruit globose, glabrous, about 1 cm in diameter.

In hedges along roadsides, near the Balic-balic cemetery fl. July–Dec., and probably in other months; known in the Philippines only from Manila. A native of Java and undoubtedly of recent introduction here.

* 7. S. **WENDLANDII** Hook. f.

A climbing glabrous vine reaching a length of several meters, the stems with a few scattered prickles. Leaves variable, simple and entire to deeply pinnately lobed or even pinnately compound, 10 to 25 cm long, oblong to oblong-ovate in outline, the midrib often with scattered prickles beneath, the lobes, when present, few, often only 3, oblong, elliptic, or ovate, acute or acuminate, close or distant. Cymes large, many-flowered, the corolla pale-blue, about 4 cm in diameter.

Singalon, Malate, etc., in gardens, cultivated, fl. June and probably in other months. A native of tropical America of recent introduction here.

In addition to the above species the potato (Sp. *patata*) (*Solanum tuberosum* L.) is imported and is always to be found in the Manila market. This species is a native of tropical America and is now cultivated in all warm countires. In the Philippines it is successfully cultivated only at medium or higher altitudes.

6. LYCOPERSICUM Miller

Coarse, ascending or spreading, pubescent, rank-scented, annual herbs. Leaves alternate, pinnate or bipinnate, the leaflets unequal in size, toothed or lobed. Flowers in extra-axillary, few-flowered racemes or cymes. Sepals 5 or 6, linear-lanceolate, spreading, acuminate. Corolla yellow, the tube short, the lobes 5 or 6, lanceolate, spreading. Stamens 5 or 6, inserted on the corolla-tube; anthers connivent in an elongated cone.

Fruit a small or large, very fleshy berry, containing numerous small seeds. (Greek "wolf" and "peach.")

Species 3 or 4, natives of America, one introduced here, cultivated and naturalized.

1. L. ESCULENTUM Mill. Tamate (Sp.); Camate (Tag.); Tomato.

Ascending or spreading, 0.5 to 1.5 m high, branched, pubescent. Leaves alternate, 10 to 40 cm long, pinnate, the leaflets irregular, oblong-ovate, toothed or lobed, sometimes lyrately-lobed, or the leaves bipinnate, the pinnae up to 18 cm in length. Inflorescence racemose or cymose, 5 to 8 cm long, few-flowered. Flowers yellow, 1 to 1.5 cm long. Fruit globose or depressed-globose, red, fleshy, smooth, in the wild state about 1 cm in diameter, in cultivated forms up to 10 cm in diameter. (Fl. Filip. *pl. 48.*)

Commonly cultivated forms with large fruits, also wild, with small fruits, fl. all the year; throughout the Philippines spontaneous and cultivated. A native of tropical America, now wild or cultivated in all warm countries.

7. CAPSICUM Linnaeus

Erect, branched, annual or perennial, glabrous herbs, often suffrutescent or shrubby. Leaves alternate, petioled, simple, entire or repand. Flowers axillary, solitary or few in each axil. Calyx small, entire or minutely 5-toothed. Corolla rotate, 5-lobed. Stamens 5, attached near the base of the corolla, the anthers free. Ovary 2- or 3-celled. Fruit an oblong, lanceolate, or ovoid berry. Seeds many. (Latin "box" from the shape of the fruit of some species.)

Species all American, some now cultivated or wild in all warm countries, 2 or 3 in the Philippines.

Shrubby or suffrutescent herbs; pedicels solitary or several in each axil, erect; fruit small, red .... 1. *C. frutescens*
Annual herbs; pedicels solitary, recurved; fruit large, green..... 2. *C. annuum*

1. C. FRUTESCENS L. (*C. minimum* Roxb.). Chile (Sp.); Pasites, Sili (Tag.); Chile Pepper.

An erect, branched, suffrutescent, shrub-like herb 0.8 to 1.5 m high Leaves oblong-ovate to ovate-lanceolate, acuminate, entire, 3 to 10 cm long Flowers solitary or several in each axil, pedicelled, pale-green or yellowish green, 8 to 9 mm in diameter. Fruit in the common form red, oblong-lanceolate, 1.5 to 2.5 cm long, with a very sharp taste. (Fl. Filip. *pl. 47.*)

In waste places, occasional, also commonly cultivated, fl. all the year throughout the Philippines, wild and cultivated. A native of tropica America, now found in all tropical countries.

*2. C. ANNUM L. var. GROSSUM (L.) Sendt. Sileng-bilog (Tag.) Gree Pepper.

An erect, branched, glabrous, annual herb about 40 cm high, the branche angled. Leaves ovate to oblong-ovate, acuminate, base decurrent-acuminat 8 to 12 cm long. Flowers axillary, solitary, about 1.8 cm in diameter, th petals somewhat straw-colored, the pedicels recurved. Fruit smooth, ovoi to oblong-ovoid, obtuse green, 6 to 10 cm long. (Fl. Filip. *pl. 142, C. tetra gonum.*)

* Var. LONGUM Sendt. Sileng-mahahaba (Tag.).

Similar to the above, but with oblong-lanceolate fruits which are more or less narrowed to the acuminate apex, up to 6 cm long and 1.5 cm in diameter.

Cultivated by Chinese gardeners for the Manila market, fl. most of the year. A native of tropical America, now cultivated in numerous forms in all warm countries.

8. PHYSALIS Linnaeus

Erect or spreading branched herbs. Leaves alternate, entire, sinuate, or lobed. Pedicels axillary, solitary. Calyx campanulate, cleft half-way to the base into 5 teeth, in fruit greatly enlarged, inflated, enclosing but free from the fruit. Corolla campanulate, yellow, sometimes purple at the base inside. Stamens 5, attached near the base of the corolla. Ovary 2-celled. Fruit a globose berry. (Greek "bladder" from the inflated calyx.)

Species 45, mostly or all natives of America, 3 or 4 introduced in the Philippines.

Glabrous or nearly so; stems angled.. 1. *P. angulata*
Pubescent; stems terete or nearly so.. 2. *P. minima*

1. P. ANGULATA L. Putocan, Caputi (Tag.).

An erect, branched, glabrous herb 1 m high or usually less, the stems angled. Leaves ovate-oblong, 5 to 9 cm long, acute or acuminate, base usually acute, often somewhat inequilateral, entire or somewhat repand-toothed. Flowers pale-yellowish, about 6 mm long. Fruit calyx oblong-ovoid, 2.5 to 3 cm long, the fruits about 1 cm in diameter. (Fl. Filip. *pl. 50.*)

In waste places, fl. Dec.–Apr., and probably in other months; widely distributed in the Philippines. A native of tropical America, introduced and naturalized here.

2. P. MINIMA L. Unti-untihan (Tag.).

An erect, branched, pubescent, annual herb 0.5 to 0.8 m high, the branches terete, often tinged with purple, the ultimate ones slightly angular. Leaves ovate, acuminate, base rounded or a little cordate, somewhat inequilateral, the margins nearly entire or very faintly undulate-lobed, 6 to 12 cm long, 4.5 to 7 cm wide. Flowers solitary, axillary, about 8 mm long, the limb 8 mm in diameter, the corolla pale-yellow, with 5 large, purple spots at the base inside. Fruit fleshy, globose, edible, about 1 cm in diameter, the inflated, accrescent calyx ovoid, acuminate, about 3 cm long, 2 cm in diameter, green, with 5 prominent, and 5 alternating somewhat more slender, purplish ribs.

In waste places, occasional, fl. July–Oct.; rather widely distributed in the Philippines. A native of tropical America, now found in most tropical countries.

124. SCROPHULARIACEAE

Herbs, rarely shrubs, with simple, opposite, rarely alternate or whorled leaves. Flowers irregular, perfect, solitary, or in axillary or terminal spikes, racemes, or panicles. Calyx usually persistent, 4- rarely 5-cleft or lobed, sometimes spathe-like. Corolla 4- or 5-lobed, usually 2-lipped, sometimes tubular or rotate, the lobes imbricate in bud. Stamens usually 4, in 2 pairs, with a rudimentary fifth one, rarely 2 or 5 perfect. Ovary 2-celled; style simple; ovules many, rarely 2, in each cell. Fruit a small capsule. Seeds small.

Genera 202, species nearly 3,000, in all parts of the world, 20 genera and about 36 species in the Philippines.

1. Perfect stamens 4.
2. Corolla rotate, not 2-lipped or tubular.................................. 1. *Scoparia*
2. Corolla tubular or campanulate, not or obscurely 2-lipped.
3. Calyx spathe-like, split down one side.......................... 2. *Centranthera*
3. Calyx regularly 5-lobed; stems green, 4-angled, nearly leafless; cultivated plants with bright-red, cylindric flowers............ 3. *Russelia*
2. Corolla distinctly 2-lipped.
3. Calyx-segments unequal, imbricate.. 4. *Bacopa*
3. Calyx-segments equal, usually valvate.
4. Calyx-tube cylindric, not winged.
5. Anther-cells separate.
6. Flowers yellow.. 5. *Lindenbergia*
6. Flowers blue or purplish.. 6. *Limnophila*
5. Anther-cells contiguous.
6. Corolla with a 2-lobed palate at the throat................ 7. *Mazus*
6. Corolla-throat not appendaged .... 8. *Vandellia*
4. Calyx-tube prominently 3- to 5-winged or keeled........... 9. *Torenia*
1. Perfect stamens 2.
2. Leaves broad, toothed, not fleshy; flowers solitary or racemose, the filaments arched, the anthers touching................................ 10. *Bonnaya*
2. Leaves narrow, entire, fleshy; flowers small, the anthers not conniving. 11. *Dopatrium*

1. SCOPARIA Linnaeus

Erect, branched, glabrous herbs or undershrubs with angular branches Leaves small, opposite or whorled, entire or toothed. Flowers small, white solitary or in pairs, axillary. Sepals 4 or 5, imbricate. Corolla rotate 4-fid, the throat bearded, the lobes subequal. Stamens 4, subequal. Capsul globose or ovoid, the valves thin, their margins inflexed. (Latin "broom.")

Species 5 or 6, all American, the following now found in most tropica countries.

1. S. DULCIS L.

An erect, much-branched, glabrous, herbaceous, or suffrutescent plan 25 to 80 cm high. Leaves opposite and whorled, lanceolate to elliptic o oblanceolate, toothed, acute, 0.5 to 2 cm long, narrowed below to the shor petiole. Flowers small, very numerous, in pairs, their pedicels slender, cm long or less. Corolla white. Capsule ovoid to globose, 2 to 3 mm i diameter. (Fl. Filip. *pl. 19.*)

Very common in open waste places, roadsides, etc., fl. all the year; i and about towns throughout the Philippines, probably of very early intro duction. A native of tropical America, now found in most other tropica countries.

2. CENTRANTHERA R. Brown

Erect, rigid, scabrid, branched herbs with oblong to linear, entire or toothed, opposite leaves, or the upper ones alternate. Flowers alternate, spicate, bracteate and 2-bracteolate. Calyx spathe-like, split on one side, the lobes cohering or free. Corolla-tube elongated, curved, inflated above, the limb oblique, the lobes spreading, subequal. Stamens 4, in 2 pairs, included; anthers meeting in pairs, the cells spurred; filaments hairy. Capsule ovoid, loculicidal, the seeds very numerous, small. (Greek "spur" and "flower," from the spurred anthers.)

Species 5, India to China, Malaya, and Australia, 1 in the Philippines.

1. **C. hispida** R. Br.

An erect, branched, rigid, scabrous, hairy herb 20 to 60 cm high. Leaves linear to linear-oblong, entire, acute or obtuse, 1 to 3 cm long, sessile. Flowers scattered, alternate, sessile. Calyx greenish, usually tinged with purple, about 8 mm long, the lobes cohering. Corolla yellow, the tube tinged with reddish-purple, about 2 cm long, the limb 1.7 cm in diameter. Capsule about 7 mm long, surrounded by the persistent calyx.

In open dry grass lands, La Loma, San Pedro Macati, etc., fl. Nov.–Jan.; widely distributed in the Philippines. India to China, Malaya and Australia.

3. RUSSELIA Jacquin

Erect shrubs with green angular branches, the leaves opposite or verticillate, few, those of the branches usually reduced to small scales. Cymes dichotomous, bracteate, lax or dense, few- to many-flowered. Calyx deeply 5-fid, the segments imbricate. Corolla red, the tube cylindric, the limb 5-fid, the lobes all subequal, spreading. Stamens 4, in 2 pairs, included; style filiform; ovules numerous. Capsule subglobose, dehiscent, the valves 2-fid. (In honor of A. Russel, an English physician.)

Species 5 or 6 in Mexico and Central America, 1 now widely cultivated in warm countries.

1. **R. JUNCEA** Zucc. Coral Flower.

An erect, branched, glabrous, nearly leafless plant with green angled stems 1 to 2 m high. Branches whorled, slender, wiry. Leaves few, scattered, small, oblong to oblong-ovate, 1.5 cm long or less, often wanting. Flowers in lax, few-flowered, racemosely arranged cymes. Calyx greenish, about 3 mm long, ovoid or cup-shaped, regularly 5-lobed. Corolla bright-red, about 2.5 cm long, about 3 mm in diameter below, slightly enlarged upward, nearly regular, very slightly 2-lipped, the lobes 5, ovate or oblong-ovate, subequal, about 3 mm long. (Fl. Filip. *pl. 461.*)

Cultivated for ornamental purposes, fl. Nov.–Feb., in some parts of the Philippines spontaneous. A native of Mexico and of comparatively recent introduction in the Philippines.

4. BACOPA Aublet

Glabrous, usually small, erect or spreading, often punctate herbs. Leaves entire or toothed. Flowers axillary or racemose, blue, white, or yellow, the pedicels bracteate or not. Sepals 5, the upper one often large. Corolla-tube cylindric, 2-lipped, the lips spreading, the upper lip outer in bud, notched or 2-lobed, the lower 3-lobed. Stamens in 2 pairs, included. Capsule with 2 or 4 valves separating from an entire column. Seeds very small, numerous. (An aboriginal South American name.)

Species about 50 in all warm countries, 2 in the Philippines.

Plant erect; leaves 2 to 5 cm long, lanceolate to linear-lanceolate, acute. 1. *B. floribunda*

Plant prostrate, creeping; leaves oblong-obovate to spatulate, obtuse, less than 2 cm long........ 2. *B. monniera*

1. B. **FLORIBUNDA** (R. Br.) Wettst.

An erect, glabrous, simple or slightly branched annual plant 8 to 30 cm high. Leaves lanceolate to linear-lanceolate, 2 to 5 cm long, 3 to 6 mm wide, slightly and distantly toothed or nearly entire. Flowers axillary, shortly pedicelled or nearly sessile, usually solitary. Calyx green, the outer 3 lobes broadly ovate, 5 to 7 mm long, 4 to 6 mm wide, the inner 2 linear-lanceolate, 4 to 5 mm long, about 1 mm wide. Corolla tubular, 5 to 6 mm long, white, with very slender purplish lines, 5-lobed. Capsule ellipsoid, about 4 mm long.

In rice paddies, Caloocan, San Pedro Macati, etc., fl. Dec.–Jan.; of local occurrence in the Philippines, surely introduced. India to Australia.

2. **B. monniera** (L.) Wettst. (*Herpestis monniera* HBK.).

A creeping, glabrous, somewhat succulent plant, the branches 5 to 20 cm long. Leaves sessile, entire, oblong-obovate to spatulate, obtuse, 8 to 15 mm long. Flowers axillary, solitary, pedicelled, the pedicels usually equaling or longer than the leaves. Calyx about 5 mm long, the outer sepal oval, the others ovate-lanceolate or lanceolate. Corolla 8 to 10 mm long, the tube nearly or quite as long as the calyx, the lobes white or pale-violet. Capsule ovoid, shorter than the calyx. (Fl. Filip. *pl. 230.*)

In open wet places, rare in our area, fl. Jan.–March; widely distributed in the Philippines. All warm countries.

5. LINDENBERGIA Lehmann

Erect, branched, usually perennial herbs. Leaves opposite or the upper ones alternate, toothed. Flowers yellow, bracteolate, in terminal racemes. Calyx campanulate, 5-fid. Corolla-tube cylindric, the upper lip lanceolate, acuminate, much narrower than the lower one which is 3-lobed. Stamens 4, in 2 pairs, included; anther-cells separate, stipitate. Capsule loculicidal, 2-grooved, the valves entire, separating from the placenta-bearing axis. (In honor of J. B. W. Lindenberg, a German botanist.)

Species about 8 in tropical Africa, Asia, and Malaya, 1 in the Philippines.

1. **L. philippensis** (Cham.) Benth.

An erect or ascending suffrutesent herb, 0.4 to 1 m high, somewhat pubescent. Leaves oblong-ovate to ovate-lanceolate, 5 to 9 cm long, 2 to 3 cm wide, acute or acuminate, base long-decurrent, margins toothed. Racemes terminal, 6 to 20 cm long, erect, the bracts narrowly lanceolate, green, acuminate, 1 cm long. Calyx green, about 7 mm long, the lobes lanceolate-acuminate. Corolla about 11 mm long, hirsute, yellow, tinged with purple outside, the throat inside with small purple dots, the upper lip, narrow, lanceolate, acuminate, the lower 5 to 6 mm broad, 3-lobed, reflexed. Capsule oblong-obovoid, acuminate, 5 mm long. (Fl. Filip. *pl. 378.*)

Crevices of the old city walls, on old building, etc., fl. all the year; widely distributed in Luzon. Chittagong, Tenasserim, Burma, China, and Java.

6. LIMNOPHILA R. Brown

Glabrous or pubescent, aromatic, gland-dotted, usually marsh or water plants. Leaves opposite or whorled, toothed, cut, or in submerged plants multifid. Flowers sessile or pedicelled, solitary, racemed, or spicate, bracteoles present or absent. Sepals narrow, subequal, or the posterior one larger. Corolla-tube cylindric, the upper lip entire or 2-fid, the lower spreading, 3-fid. Stamens 4, in 2 pairs, included. Capsule ovoid or oblong, dehiscent. (Greek "swamp" and "to love," from the habitat of most species.)

Species about 25, Africa, Asia, through Malaya to Australia and Polynesia, about 8 in the Philippines.

Leaves shortly petioled, narrowed at the base; flowers pedicelled. 1. *L. manilensis*

Leaves sessile, base broad, somewhat clasping the stem; flowers sessile. 2. *L. fragrans*

1. L. manilensis Merr.

An erect or spreading, simple or ultimately much branched, more or less pubescent, aromatic herb, the stems up to 50 cm in length, usually much shorter. Leaves opposite, lanceolate to oblong-lanceolate, sessile, serrulate, acute or obtuse, 1.5 to 3 cm long. Flowers axillary, solitary, shortly pedicelled. Calyx 5 to 6 mm long, somewhat pubescent, the tube green, the lobes lanceolate, acuminate, purple. Corolla purple, about 9 m long. Capsule ovoid, 3 to 4 mm long.

In open wet grass lands, La Loma, Caloocan, etc., fl. Dec.–Feb.; of local occurrence in the Philippines. Endemic.

2. L. fragrans (Forst. f.) Seem. (*L. serrata* Gaudich.).

A procumbent or ascending, usually simple, aromatic, glabrous or nearly glabrous plant, usually less than 20 cm high. Leaves oblong, serrate, 1 to 2 cm long, sessile, the base broad and somewhat clasping the stems. Flowers axillary, sessile, solitary. Calyx glabrous, the segments lanceolate, acuminate. Corolla very pale lilac, about as long as the calyx.

In low wet places, old rice paddies, etc., San Lazaro, Guadalupe, etc., fl. Dec.–Jan.; of local occurrence in the Philippines. Malay Archipelago to Polynesia.

7. MAZUS Loureiro

Small herbs, the leaves below opposite or rosulate, above opposite or alternate. Flowers in terminal racemes, the bracteoles small. Calyx campanulate, 5-fid. Corolla-tube short, the upper lip erect, 2-fid, the lower much larger, spreading, 3-fid, the throat with a 2-lobed palate. Stamens 4, in 2 pairs. Capsule included in the calyx, globose, loculicidal. Seeds minute, numerous. (Greek "nipple" from the papillae at the corolla throat.)

Species about 12, mostly Asiatic, 1 in Australia, the following extending to the Philippines.

1. M. japonicus (Thunb.) O. Kuntze. (*M. rugosus* Lour.).

An annual, erect, glabrous or somewhat hairy herb 6 to 20 cm high. Basal leaves numerous, crowded, subrosulate, obovate-oblong, obtuse, crenate, 2 to 5 cm long, base narrowed, decurrent along the petiole. Flowering stems one to several, erect, usually leafless, the flowers scattered, alternate, the bracts lanceolate, acuminate, 1.5 to 2 mm long. Calyx green, about 7 mm long, cleft half way to the base into 5 oblong lobes. Corolla pale-purple, about 11 mm long, the upper lip ovate, acuminate, the lower one about 8 mm wide, blotched with yellow above the throat, the lateral lobes broader than the middle one. Capsule about 3 mm long, the calyx-lobes spreading in fruit.

On wet cliffs, Guadalupe, fl. Oct.–Dec., rare; widely distributed in the Philippines, but local. India to Japan southward to Java.

8. VANDELLIA Linnaeus

Usually small, annual, erect or spreading, glabrous or pubescent herbs. Leaves opposite, penninerved, entire or toothed. Flowers axillary or racemose. Sepals 5, free or united into a campanulate calyx. Corolla-tube cylindric, the upper lip erect, broad, concave, notched or bifid, the lower broader, spreading, 3-lobed. Stamens 4, all perfect, the 2 anterior ones with arched filaments which are appendaged at or near the base; anthers touching or cohering in pairs under the upper lip, the cells divaricate. Stigma 2-lamellate. Capsule septicidal, the valves separating from the placenta-bearing septum. (In honor of D. Vandelli, a Portuguese botanist.)

Species about 26, chiefly in tropical Asia, about 6 in the Philippines.

1. Capsule about as long as the calyx or shorter.
  2. Calyx cleft nearly to the base into 5 lobes.
    3. Corolla about 10 mm long.. 1. *V. pusilla*
    3. Corolla about 5 mm long.. 2. *V. viscosa*
  2. Calyx 5-toothed, the teeth or lobes not reaching to the middle. 3. *V. crustacea*
1. Capsule much longer than the calyx.............................. 4. *V. cordifolia*

1. V. pusilla (Willd.) Merr. (*V. scabra* Benth.).

A slender, erect or ascending, simple or somewhat branched annual herb, 5 to 12 cm high, with scattered white hairs. Leaves sessile, ovate, acute or obtuse, entire or obscurely toothed, 8 to 14 mm long. Pedicels axillary and terminal, elongated. Calyx green, 3.5 mm long, cleft nearly to the base into 5, equal, lanceolate sepals. Corolla 10 to 11 mm long, pale-purple, the lower lip with a yellow spot at the base. Capsule about as long as the calyx.

In open grass lands, old rice fields, etc. fl. all the year; widely distributed in the Philippines. Tropical Asia and Malaya, Madagascar, and South Africa.

2. V. viscosa (Willd.) Merr. (*V. hirsuta* Ham.).

A small, erect or ascending, somewhat succulent, annual herb, 8 to 15 cm high, more or less clothed with spreading hairs. Lower leaves shortly petioled, oblong-ovate to elliptic-ovate, obtuse, distantly and shallowly toothed, 3.5 to 6 cm long, the upper ones similar, but sessile and somewhat smaller. Racemes simple or slightly branched, the pedicels 5 to 9 mm long. Calyx green, about 3 mm long, cleft nearly to the base into 5, lanceolate, acuminate lobes. Corolla 5 to 6 mm long, pink or white, tinged with purple. Capsules ovoid, about 3 mm long. (Fl. Filip. *pl. 368.*)

On wet cliffs, Guadalupe, rare, fl. Oct.–Dec.; not common in the Philippines. India to China southward to Borneo and Java.

3. **V. crustacea** (L.) Benth.

A diffusely branched, glabrous, suberect or spreading annual 8 to 20 cm high. Leaves ovate, acute or obtuse, distantly serrate, short-petioled, 8 to 15 mm long. Flowers axillary, solitary, or the upper ones subracemose, the pedicels 1 to 3 cm long. Calyx green or purplish, 4 to 5 mm long, the lobes acute, about 1.5 mm long. Corolla about 9 mm long, purple. Capsule oblong-ovate to ellipsoid, 5 to 6 mm long, included in and about as long as the persistent calyx.

In open grass lands, waste places, etc., fl. all the year; common and widely distributed in the Philippines. Tropics of the Old World, introduced in tropical America.

4. **V. cordifolia** (Colsm.) G. Don (*V. pedunculata* Benth.).

A slender, glabrous, simple or slightly branched plant, the stems prostrate below, 10 to 30 cm in length, the flowering branches ascending. Leaves sessile or shortly petioled, ovate, acute or obtuse, base cordate, margins slightly toothed, 1 to 2 cm long. Pedicels axillary, solitary, longer than the leaves, also frequently in terminal racemes. Calyx green, about 5 mm long. Corolla pink or purplish, about 8 mm long. Capsule cylindric, oblong-lanceolate, tipped by the style, about twice as long as the calyx-segments.

In open damp grass lands, occasional, fl. Sept.–Dec.; widely distributed in Luzon. India to southern China, Malay Peninsula, and Borneo.

9. TORENIA Linnaeus

Annual, erect or prostrate, usually branched, glabrous or pubescent herbs. Leaves opposite, entire, crenate, or serrate. Flowers small to large, axillary and solitary, or in terminal, often leafy racemes, the pedicels ebracteolate. Calyx tubular, 3- to 5-winged, plaited, or keeled, 2-lipped or 3- to 5-toothed. Corolla-tube cylindric, dilated above, the upper lip concave, notched or 2-fid, the lower one larger, spreading, 3-lobed. Stamens 4, in 2 pairs, the 2 upper ones included, the 2 lower appendaged at the base and conniving under the upper lip; anthers touching or cohering in pairs. Capsule linear or oblong, included, the valves separating from the axis. (Named after O. Toren, a clergyman who travelled in China.)

Species about 30, mostly in tropical Asia and Africa, 3 in the Philippines.

* 1. T. CONCOLOR Lindl.

An erect, branched, sparingly pubescent, annual herb 10 to 30 cm high, the stems 4-angled. Leaves ovate, acute or acuminate, toothed, 1 to 3 cm long. Flowers in terminal few-flowered racemes or solitary in the upper axils. Calyx green, ovoid, about 1.5 cm long, prominently 5-winged. Corolla 2.5 to 3 cm long, violet-purple, the lower lip deep-black-purple and with a large yellow spot.

Somewhat cultivated, fl. Dec.–March. A native of southern China, of comparatively recent introduction here.

10. BONNAYA Link & Otto

Slender, prostrate or ascending, annual, glabrous herbs. Leaves opposite, penninerved, entire or serrate. Flowers solitary, axillary, or the upper ones opposite and subracemose. Calyx-segments 5, narrow. Corolla-tube cylindric, the upper lip broad, concave, 2-fid, the lower spreading, 3-lobed. Perfect stamens 2, not exserted; anthers touching, their cells divaricate; staminodes 2, entire, glandular. Stigma 2-lamellate. Capsule narrow, long-exserted from the calyx, septicidal, the valves entire, separating from the placenta-bearing septum.

Species about 8, in tropical Africa, Asia, and Malaya, 3 in the Philippines.

Leaves closely, sharply, and deeply serrate, the teeth mucronate. 1. *B. brachiata*
Leaves rather distantly toothed .... 2. *B. veronicaefolia*

1. **B. brachiata** Link & Otto.

An erect, diffusely branched, annual herb 10 to 20 cm high, the branches spreading, the lower ones often decumbent. Leaves sessile, oblong, obtuse or acute, 1.5 to 3 cm long, sharply and closely serrate with mucronate teeth. Racemes terminal, 3 to 6 cm long, the flowers opposite, short pedicelled, bracteate. Calyx green, about 5 mm long. Corolla pink-purple, about 7 mm long. Capsules slender, cylindric, about 1 cm long.

In open places, damp banks, etc., occasional, fl. Aug.–Dec.; rather widely distributed in the Philippines. India to China and Malaya.

2. **B. veronicaefolia** (Retz.) Spreng.

Erect or spreading, simple or somewhat branched, slender, glabrous, the stems 10 to 20 cm in length. Leaves oblong to oblong-oblanceolate, acute or obtuse, sessile or shortly petioled, base gradually narrowed, margins rather distantly toothed, 1 to 3 cm long. Flowers axillary, solitary, and in short terminal racemes, the pedicels shorter than, or exceeding, the leaves. Calyx green, about 5 mm long, the lobes narrow. Corolla white to pale-lilac, about 8 mm long. Capsule linear-lanceolate, twice as long as the calyx or more.

In open damp grassy places, occasional, fl. Sept.–Dec.; widely distributed in the Philippines. India to China and Malaya.

11. DOPATRIUM Hamilton

Slender, erect, simple or branched, somewhat succulent, annual herbs. Leaves few, opposite, the upper remote, small. Flowers small, pale-purple, axillary, solitary, ebracteolate, sessile or pedicelled. Calyx 5-fid. Corolla-tube slender below, the throat broad, the upper lip short, 2-fid, the lower one broad, 3-lobed. Capsule very small, ovoid, loculicidal.

Species 5, Africa, Asia, and Australia, a single one in the Philippines.

1. **D. junceum** (Roxb.) Ham.

An erect, fleshy, annual herb 8 to 25 cm high, branched from the base, the branches terete. Leaves entire, oblong, the radical ones, when present few, up to 2.5 cm long, those on the branches 1 cm long or less. Flowers few, axillary, slenderly pedicelled or subsessile, pink or pale-purple, about 5 mm long.

In old rice paddies, Caloocan, rare, fl. Nov.–Dec.; apparently of very local occurrence in the Philippines. India to Japan southward to Australia.

125. BIGNONIACEAE (BIGNONIA OR TUE FAMILY)

Shrubs, or trees, sometimes scandent. Leaves opposite or alternate, simple or 1- to 3-pinnate. Flowers terminal or axillary, racemose or paniculate, rarely solitary or fascicled, irregular, mostly large and showy, perfect. Calyx gamosepalus, campanulate or tubular, or split down one side and spathe-like, long or short, sometimes 2- to 5-lobed or toothed. Corolla long or short, tubular-ventricose, the limb often campanulate, spreading, often 2-lipped, 5-lobed. Stamens 4, in 2 pairs, or 5 perfect, or the 5th represented by a staminode. Disk cushion-like or annular. Ovary 2-celled; ovules many. Fruit on elongated, dehiscent capsule with numerous winged seeds, or oblong, cylindric, or globose, indehiscent, with wingless seeds imbedded in pulp.

Genera 100, species 450 or more, tropics generally, 9 genera, mostly introduced, and about 18 species in the Philippines.

1. Leaves 2- or 3-pinnate.
    2. Leaflets small, less than 1 cm long.. 1. *Jacaranda*
    2. Leaflets large, 5 to 15 cm long; flowers dark-purple; capsule up to 1 m in length.. 2. *Oroxylum*
1. Leaves simply pinnate, or simple.
    2. Fruit dehiscent; seeds winged.
        3. Leaflets toothed; flowers yellow, 4 to 4.5 cm long; cultivated. 3. *Tecoma*
        3. Leaflets entire; flowers 10 cm long or more.
            4. Flowers white, up to 18 cm long............................ 4. *Dolichandrone*
            4. Flowers red, 10 cm long; cultivated only.................... 5. *Spathodea*
    2. Fruits indehiscent; cultivated only.
        3. Leaves pinnate; flowers and fruits on very long pendulous peduncles. 6. *Kigelia*
        3. Leaves simple or 3-foliolate, fascicled at the nodes; flowers axillary or cauline, solitary or fascicled; fruit very large, globose. 7. *Crescentia*

1. JACARANDA Jussieu

Glabrous or somewhat pubescent trees with opposite, bipinnate leaves, and numerous small leaflets. Flowers blue or purple, in terminal panicles. Calyx small, bell-shaped or shortly tubular, 5-toothed. Corolla-tube enlarged above, straight or curved, the limb somewhat 2-lipped, 5-lobed. Stamens 4, in 2 pairs, included, with a staminode about as long as the stamens. Disk thick, cushion-like. Ovary sessile, 2-celled. Fruit an oblong, ovate, or suborbicular capsule, loculicidally dehiscent, compressed. Seeds compressed, surrounded by a hyaline wing. (A Brazilian name.)

Species about 30, all native of tropical America, 1 introduced and cultivated in Manila.

*** 1. J. OVALIFOLIA** R. Br. (*J. mimosaefolia* D. Don).

A small or medium-sized glabrous tree. Leaves bipinnate, 20 to 25 cm long; pinnae 7 to 14 pairs, 9 cm long or less; leaflets oblong-rhomboid, 5 to 8 mm long, the terminal one larger. Inflorescence terminal, cymose. Flowers pale-blueish-purple. Calyx small. Corolla 5 cm long, the tube slender and curved below, inflated above, the limb 2-lipped, one lip 2-lobed, the other 3-lobed.

Cultivated for ornamental purposes, Singalon, Cementerio del Norte, etc., fl. Oct.–May; of recent introduction here, a native of tropical America.

2. OROXYLUM Ventenant

A glabrous tree, sparingly branched. Leaves opposite, 2- to 4-pinnate, very large; leaflets ovate, entire. Raceme erect, terminal, often elongated. Calyx large, bell-shaped, truncate or somewhat toothed. Corolla large, bell-shaped or cylindric, somewhat ventricose, purplish, the lobes 5, subequal. Stamens 5. Capsule large, very long, compressed parallel with the septum, septicidally 2-valved. Seeds numerous, thin, the surrounding wing very thin, hyaline, broad wing. (Greek "mountain" and "wood.")

A monotypic genus of the Indo-Malayan region.

1. **O. indicum** (L.) Vent. Pincapincahan, Tagbilao (Tag.).

A tree 4 to 12 m high with few or no branches. Leaves attaining 1.5 m in length, 3- or 4-pinnate, the rachis and branches jointed, leaflets numerous, ovate, acuminate, acute, or obtuse, 5 to 15 cm long. Racemes terminal, erect flowering only at the apex, the peduncle and rachis 1 to 3 m in length. Calyx about 3 cm long. Corolla about 6 to 7 cm long, dark-purple, fleshy, bell-shaped, unequal, 5-lobed. Capsule up to 1 m long, 8 cm wide, 1 cm thick or less, flat, slightly curved, margins somewhat incurved or nearly straight, the valves woody, the septum thin. Seeds, including the very thin wings, up to 6 cm in width. (Fl. Filip. *pl. 219, Calosanthes indica.*)

In thickets near Balintauac, fl. July–Nov., and probably in other months; widely distributed in the Philippines. India to China and Malaya.

3. TECOMA Jussieu

Shrubs or small trees, sometimes scandent, glabrous or somewhat pubescent. Leaves opposite, simple or simply pinnate, toothed. Racemes or panicles terminal. Flowers yellow. Calyx tubular-campanulate, 5-toothed. Corolla-tube elongated, straight or incurved, inflated upward, 5-lobed. Stamens 4, in 2 pairs. Disk annular. Ovary sessile. Capsule linear or elongated, straight or curved, compressed, loculicidally dehiscent. Seeds many, the wings thin, hyaline. (From the Mexican name, *tecomaxochitl.*)

Species about 80, mostly in tropical America, a single introduced one in the Philippines.

1. T. STANS (L.) Juss.

An erect, branched, sparingly pubescent or nearly glabrous shrub, 2 to 4 m high. Leaves opposite, odd-pinnate, up to 20 cm in length; leaflets 5 or 7, lanceolate to oblong-lanceolate, 6 to 13 cm long, long and slenderly acuminate, base acute or acuminate, margins sharply serrate. Panicles terminal. Flowers racemosely arranged on the few branches. Calyx green, 5 mm long, 5-toothed. Corolla yellow, 4 to 4.5 cm long, tube inflated upward. Capsules linear, about 15 cm long, 8 mm wide, acuminate, compressed.

Occasionally cultivated for ornamental purposes, fl. Nov.–May; in some parts of the Philippines apparently subspontaneous. A native of tropical America.

4. DOLICHANDRONE Seemann

Glabrous or nearly glabrous trees, with opposite, 1-pinnate leaves. Racemes terminal, few-flowered. Calyx closed in bud, in flower cleft to the base on one side and spathe-like. Corolla-tube very long, slender, narrowly funnel-shaped above, the limb spreading, 5-lobed, the lobes crisped. Stamens 4, in 2 pairs. Capsule elongated, somewhat curved, cylindric or slightly compressed, loculicidally 2-valved. Seeds thin, broadly winged on both sides. (Greek "long" and "a man," from the long flowers and stamens.)

Species 6 or 7, Madagascar to tropical Asia, Malaya, and Australia, a single one in the Philippines.

1. **D. spathacea** (L. f.) K. Sch. (*D. rheedii* Seem.). Tue (Tag.).

A glabrous tree 5 to 15 m high. Leaves 30 to 40 cm long, opposite; leaflets 7 to 9, ovate to ovate-lanceolate or ovate-elliptic, slenderly long-acuminate, base inequilateral, 7 to 15 cm long. Racemes terminal, short, few-flowered. Calyx 4 to 5 cm long, spathe-like, split down one side to the base. Corolla white, the tube rather slender, cylindric, 9 to 11 cm long, funnel-shaped or bell-shaped above, the limb 5 to 10 cm in diameter, somewhat lobed. Capsule 30 to 40 cm long, subcylindric or slightly compressed, pointed, 2 to 2.5 cm thick, the seeds very numerous, winged, rectangular. (Fl. Filip. *pl. 242, Spathodea luzonica.*)

Along tidal streams, scattered, fl. most of the year; widely distributed in the Philippines along the seashore. India to Malaya.

5. SPATHODEA Beauvois

Trees with ample odd-pinnate leaves. Flowers large, in short terminal racemes. Calyx densely tomentose, at flowering time split nearly to the base on one side, curved, spathe-like. Corolla red, oblique, the tube contracted at the base, broadly ventricose-campanulate above, the limb large, 5-lobed. Stamens 4, in 2 pairs, inserted near the base of the corolla. Ovary sessile; ovules numerous. Capsule oblong-lanceolate, loculicidally dehiscent, compressed parallel to the septum. Seeds compressed, surrounded by a hyaline wing. (Greek "spathe" and "resembling," from the spathe-like calyx.)

Species 3 in tropical Africa, 1 introduced and cultivated in Manila.

*1 S. CAMPANULATA Beauv.

A medium-sized tree with odd-pinnate leaves and large flowers. Leaves 20 to 25 cm long; leaflets about 9, elliptic-oblong, slightly acuminate, the upper ones about 10 cm long, the lower ones smaller. Racemes axillary, few-flowered. Calyx spathe-like, strongly curved, brownish, finely pubescent, acuminate, split nearly to the base on one side. Corolla about 10 cm long, curved, the tube narrow below, above strongly inflated, about 7 cm in diameter, 5-lobed.

Cultivated for ornamental purposes, old Botanic Garden, Cementerio del Norte, etc., fl. most of the year. A native of tropical Africa now cultivated in many other tropical countries.

6. KIGELIA DeCandolle

Spreading trees with ample, odd-pinnate, alternate leaves. Flowers large, reddish, in a lax, very long-peduncled, pendent panicle. Calyx large, coriaceous, closed in bud, in flower 2- to 5-lobed or toothed. Corolla-tube contracted at the base, above much enlarged and broadly bell-shaped, the limb somewhat 2-lipped, one lip 2-lobed, the other 3-lobed. Stamens 4, in 2 pairs, slightly exserted. Disk thick, annular. Ovary sessile, 1-celled, placentae 2. Fruit large, oblong or cylindric, thick, indehiscent, the pericarp fleshy. Seeds many, wingless. (From the Mozambique name.)

Species 3 or 4 in tropical and subtropical Africa, 1 introduced and cultivated in Manila.

* 1. K. **AFRICANA** (Lam.) Benth.

A wide-spreading deciduous tree about 10 m high with odd-pinnate leaves, the flowers paniculate, on very long pendulous peduncles. Leaves alternate. Leaflets ovate to elliptic-ovate, 8 to 16 cm long, acute or obtuse, opposite. Peduncles very long. Calyx 2.5 to 3 cm long, unequally 5-toothed or lobed. Corolla about 10 cm long, the tube rather slender, the limb broadly bell-shaped, somewhat curved, 5-lobed. Fruit large, oblong or oblong-cylindric, indehiscent.

A single tree in the old Botanic Garden, fl. May–July. A native of west tropical Africa, now cultivated in some other tropical countries.

7. CRESCENTIA Linnaeus

Small or medium sized glabrous trees, with alternate, simple or 3-foliolate leaves, solitary or fascicled at the nodes. Flowers on the trunk or axillary, solitary or fascicled. Calyx closed in bud, in flower broadly 2- to 5-lobed. Corolla-tube broad, bell-shaped, in front with a transverse fold, ventricose. Stamens 4, in 2 pairs. Ovary sessile, 1-celled, placentae 2. Fruit large, globose, indehiscent, the pericarp fleshy, becoming hardened. Seeds many, imbedded in the pulp, wingless. (In honor of P. de Crescenzi, an early Italian botanist.)

Species about 5 in Mexico and Central America, 2 introduced in the Philippines.

Leaves simple; flowers on the branches... 1. *C. cujete*
Leaves 3-foliolate; flowers on the trunk... 2. *C. alata*

* 1. C. **CUJETE** L. Calabash Tree.

A glabrous, much-branched tree 4 to 5 m high. Leaves alternate, often fascicled at the nodes, oblanceolate, obtuse, or shortly acuminate, base gradually narrowed, subsessile, 5 to 17 cm long, the upper surface glossy. Flowers axillary, solitary or in pairs, pedicelled, about 6 cm long, with a somewhat foetid odor. Calyx about 2 cm long, split into 2 lobes. Corolla pale-greenish with faint purplish lines, inflated, slightly curved, horizontally plicate on the lower side, the lobes 5, equal, acuminate, toothed. Fruit globose, green or purplish, 15 to 18 cm in diameter.

Occasionally cultivated, Singalon, fl. all the year. A species of very recent introduction, a native of tropical America.

* 2. C. **ALATA** HBK. (*C. alata* Blanco). Hoya cruz (Sp.–Fil.).

A small tree 3 to 6 m high. Leaves in fascicles at the nodes of the branches, 3-foliolate, the petioles broadly winged, oblanceolate, about 1 cm wide, gradually narrowed to the slender base, the leaflets oblong-ovate, retuse, base narrowed, acute, sessile, 3 to 7 cm long, the middle one often longer than the two lateral ones. Flowers solitary, borne on the trunk, brownish, rank-scented, sessile or shortly pedicelled. Calyx split into two lobes, about 1.5 cm longer. Corolla somewhat campanulate, about 6 cm long, with 5 short lobes, the tube horizontally plicate on one side. Fruit hard, globose, about 5 cm in diameter. (Fl. Filip. *pl. 327.*)

Rarely cultivated, fl. Mar.–Apr.; now only occasionally cultivated in the Philippines. Introduced from Mexico at an early date.

126. PEDALIACEAE (SESAME OR LINGA FAMILY)

Herbs with opposite leaves, or the upper ones alternate, entire, toothed, or divided. Flowers irregular, axillary, solitary, and in terminal racemes, rarely clustered, the pedicles short, the bracts none or very small. Calyx deeply 4- or 5-lobed. Corolla tubular-ventricose, the limb obscurely 2-lipped, 5-lobed, the lobes imbricate. Stamens 4, in 2 pairs. Ovary 2-celled; style filiform; stigma shortly 2-lobed; ovules many, superposed. Fruit a 2- or 4-celled capsule, dehiscent or indehiscent. Seeds exalbuminous, small.

Genera 14, species about 50, a single representative in the Philippines.

1. SESAMUM Linnaeus

Erect herbs with entire, toothed or lobed leaves. Flowers axillary, solitary, or few and fascicled, short-pedicelled, pale or purplish. Calyx small, 5-partite. Corolla tubular-ventricose, base somewhat inflated, the limb 2-lipped, the lobes 5, rounded. Stamens 4, in 2 pairs, included; anthers sagittate. Ovary 2-celled, early falsely 4-celled; ovules many. Capsule oblong, loculicidally 2-valved, unarmed. Seeds numerous, obliquely oblong. (From the Egyptian name of one of the species.)

Species about 12, Indian and African, the following widely distributed in cultivation.

1. S. **ORIENTALE** L. (*S. indicum* DC.). Linga (Tag.); Ajonjoli (Sp.); Sesame.

An erect annual herb, 50 to 80 cm high, pubescent or puberulent. Leaves oblong or ovate, 3 to 10 cm long, the lower ones often lobed, the middle ones toothed, the uppermost subentire; petioles 1 to 5 cm long. Pedicels short, solitary, or 2 or 3 in each axil. Sepals lanceolate, 6 to 7 mm long. Corolla about 3 cm long, pubescent, whitish, or with purplish, red, or yellow marks. Capsule about 2.5 cm long, oblong, erect, scabrid-pilose, splitting half-way or quite to the base. (Fl. Filip. *pl. 273.*)

Widely cultivated in the Philippines, occasionally subspontaneous, fl. most of the year. Probably a native of tropical Asia, but now found in most tropical and subtemperate countries; certainly not a native of the Philippines, although of prehistoric introduction.

127. GESNERIACEAE (GESNERIA FAMILY)

Herbs or undershrubs with opposite or alternate, entire or toothed leaves. Flowers axillary or terminal, solitary, fascicled. or racemose, usually bracteate and bracteolate. Flowers perfect, irregular, rarely regular, small to large. Calyx 5-cleft. Corolla gamopetalous, the tube long or short, subequally 5-lobed or 2-lipped and one lip 2-lobed, the other 3-lobed. Stamens inserted on the corolla-tube, mostly in 2 pairs, often only 2 fertile. Ovary superior 1- or 2-celled; ovules many; style linear; ovules very numerous. Fruit berry-like or capsular, indehiscent or dehiscent. Seeds small, fusiform or ovoid, smooth.

Genera about 100, species more than 900, in most tropical countries, about 11 genera and 70 or more species in the Philippines.

1. RHYNCHOGLOSSUM Blume

Succulent herbs, slightly pubescent or nearly glabrous. Leaves alternate, obliquely elliptic, thin, base very unequal-sided, one side broadly rounded or cordate, the other acute, entire or slightly sinuate. Racemes elongated, slender, many-flowered. Calyx ovoid or campanulate, 5-lobed. Corolla blue, the tube cylindric, contracted at the mouth, the limb 2-lipped, the upper lip short, bifid, the lower longer, 3-lobed. Stamens 2, perfect, included; anthers connivent. Ovary ovoid. Capsule included in the calyx, ellipsoid, membranaceous, loculicidally 2-valved; seeds small, numerous. (Greek "beak" and "throat," from the small upper lip of the corolla.)

Species 3 or 4, India to Malaya, 2 or 3 in the Philippines.

1. **R. obliquum** Blume.

An erect, branched, annual, slightly pubescent or nearly glabrous, succulent herb 10 to 60 cm high. Leaves membranaceous, 4 to 15 cm long, entire, acute or acuminate, the round side of the base extending much farther along the petiole than the acute side. Racemes slender, erect, 5 to 15 long. Flowers few to many, rather distant. Calyx green, about 5 mm long. Corolla blue, the tube slightly incurved, about 1 cm long.

On wet cliffs opposite Fort McKinley, rare, fl. Sept.–Dec.; widely distributed in the Philippines in damp ravines, etc. Malaya, a variety in India.

128. LENTIBULARIACEAE (BLADDERWORT FAMILY)

Annual, terrestrial or aquatic herbs, the leaves whorled, persistent, pinnately compound, divided into numerous filiform segments, the segments usually bearing small bladders at their bases, or in the terrestrial species alternate and disappearing before flowering. Scapes erect, the flowers racemosely arranged, yellow, purplish, or nearly white. Flowers perfect, irregular, few. Calyx divided into 2 distinct or nearly distinct sepals, often enlarged in fruit. Corolla 2-lipped, base spurred, the upper lip entire or 2-lobed, the lower larger, often 3- to 5-lobed. Stamens 2, inserted on the base of the corolla. Ovary superior, 1-celled, many-ovuled. Fruit a small 2- or 4-valved capsule.

Genera 5, species about 250, in all parts of the world, a single genus with about 10 species in the Philippines.

1. UTRICULARIA Linnaeus

Characters of the Family as given above. (From the Latin "little bladder" in allusion to the bladder-bearing leaves.)

1. Aquatic; leaves whorled, persistent, pinnately divided into very numerous filiform segments .... 1. *U. flexuosa*
1. Terrestrial slender plants, leaflets at time of flowering.
  2. Erect.
    3. Flowers yellow .... 2. *U. bifida*
    3. Flowers blue .... 3. *U. nivea*
  2. Twining .... 4. *U. tenerrima*

1. **U. flexuosa** Vahl (*U. calumpitensis* Blanco). Inata (Tag.).

A submerged plant in fresh water, the stems floating, branched, much elongated. Leaves whorled, 4 to 7 cm long, pinnately compound, divided into very numerous filiform segments, some or most of the segments with a small, nearly globose bladder near the base. Scaps erect, emerging above the surface of the water, 6 to 15 cm long. Flowers few, yellow, racemosely arranged, about 12 mm long.

In ditches, slow streams of fresh water etc., fl. Feb.–May; widely distributed in the Philippines. India and Ceylon to southern China, Malaya, and Australia.

2. **U. bifida** L.

A slender erect annual plant, the scapes 6 to 20 cm high, the leaves radical, linear-spathulate, 1 cm long or less, usually absent at time of flowering. Flowers yellow, racemose, few. Calyx 2-lobed, the lobes about 3 mm long, ovate or obovate, rounded, subequal, accrescent and enclosing the capsule. Corolla, including the spur, 6 to 7 mm long, the spur as long as the calyx-lobes, somewhat curved. Capsule ovoid, 3 to 4 mm long, enclosed by the calyx-segments.

In open wet places, San Lazaro, Masambong, etc., fl. Aug.–Dec.; widely distributed in the Philippines. India to southern China and Malaya.

3. **U. nivea** Vahl.

A very slender, erect, glabrous, simple annual, the leaves evanescent at time of flowering, the scapes 10 to 25 cm high; scales of the scape 2 to 3 mm long, about equally prolonged above and below the point of attachment, pointed at both ends, appressed. Flowers few, racemosely arranged on the upper part of the scape, the pedicels short. Calyx-lobes about 2 mm long, broadly ovate, rounded, entire, pale-greenish. Corolla pale-purple, including the spur 5 to 6 mm long, the upper lip oblong, truncate or obtuse, about 2.5 mm long, the lower lip much larger, entire, strongly recurved, rounded, with a yellow spot at the geniculation, more than one-half as long as the spur. Capsule ovoid, 2 mm long.

In open wet grass lands, La Loma etc., rare; fl. Oct.–Dec.; India and Ceylon to southern China and Malaya.

4. **U. tenerrima** Merr.

A very slender, twining, glabrous, annual plant, leafless at time of flowering, 3 to 15 cm high, the scales on the scape few, basifixed, ovate, concave, about 1 mm long. Flowers blue, scattered, shortly pedicelled. Sepals green, ovate, about 2.5 mm long, in fruit up to 4.5 mm long. Upper lip of the corolla about 3 mm long, the apical part oblong, obtuse, the lower lip reflexed, entire, about 3 mm long and 3 mm wide (spread), the spur about 2 mm long. Capsule ovoid, slightly compressed, 2.5 mm long.

In open wet grass lands, near La Loma, twining on grasses and other plants, fl. Aug.–Sept. Known in the Philippines only from the vicinity of Manila. India.

129. ACANTHACEAE (ACANTHUS OR DILIUARIO FAMILY)

Herbs or shrubs, erect, scandent, or prostrate. Leaves opposite, entire or somewhat lobed, exstipulate. Flowers bracteate and 2-bracteolate, or these sometimes wanting, variously paniculate, racemose, or spicate, rarely solitary. Calyx 5-partite, or (in *Thunbergia*) small, or reduced to a mere ring. Corolla 2-lipped, or subequally 5-lobed, the lobes imbricated or twisted in bud. Stamens 4 or 2, inserted on the corolla-tube; anthers 2- or 1-celled, cells sometimes remote. Ovary superior, 2-celled; ovules 1 or more in each cell. Fruit a loculicidal capsule, the valves often recurved, carrying the seeds on the half-septa. Seeds (except in *Thunbergia*) hard, seated on upcurved supports (*retinacula*), ovoid or compressed, testa smooth or rugose; albumen none; radicle next to the hilum.

Genera 204, species about 2,000 in tropical and warm-temperate regions, 25 genera and about 100 species in the Philippines.

1. Perfect stamens 2, staminodes or much-reduced imperfect stamens often present.
  2. Herbs.
    3. Flowers in axillary clusters.......... 1. *Dicliptera*
    3. Flowers in spikes.
      4. Erect, the spikes on elongated, rigid peduncles.......... 2. *Elytraria*
      4. Prostrate or spreading; spikes sessile.......... 3. *Justicia*
  2. Shrubs or undershrubs.
    3. Corolla narrowly funnel-shaped.......... 4. *Barleria*
    3. Corolla tubular, salver-shaped, or 2-lipped.
      4. Corolla salver-shaped, subequally 5-lobed or obscurely 2-lipped.
        5. Shrubs with purple or variegated leaves; corolla lobes with scatered, small, purplish spots.......... 5. *Odontonema*
        5. Undershrubs with green leaves; lower corolla-lobe with a large purple spot.......... 6. *Pseuderanthemum*
      4. Corolla distinctly 2-lipped.
        5. One anther-cell below the other, tailed at the base.... 3. *Justicia*
        5. One anther-cell somewhat below the other, rounded or acute at the base, the upper lip of the corolla small and twisted. 7. *Rhinacanthus*
        5. Anther cells at an equal or nearly equal height, not tailed; leaves brownish-purple or variegated.......... 8. *Graptophyllum*
1. Perfect stamens 4, in two pairs.
  2. Seeds not supported by curved bodies.
    3. Vines or shrubs with showy, medium or large flowers; seeds 2 or 4. 9. *Thunbergia*
    3. A small erect herb with small flowers and numerous seeds. 10. *Staurogyne*
  2. Seeds supported on curved, hard bodies (retinacula).
    3. Upper corolla-lip obsolete, the lower one broad; shrubs with spiny leaves.......... 11. *Acanthus*
    3. Corolla 2-lipped or 5-lobed; herbs with spineless leaves.
      4. Capsule 2- or 4-seeded; flowers in dense, spike-like heads. 12. *Lepidagathis*
      4. Capsule with more than 4 seeds.
        5. Flowers axillary, solitary or fascicled.
          6. Capsule oblong to linear, seed-bearing throughout; flowers fascicled.......... 13. *Hygrophila*
          6. Capsule clavate, base narrowed, seed-bearing above only; flowers solitary.......... 14. *Ruellia*
        5. Flowers in terminal spikes.
          6. Capsules linear to linear-oblong; leaves usually toothed or crenate.......... 15. *Hemigraphis*
          6. Capsules ovate to orbicular; the bracts large, foliaceous, spreading, arranged in 2 ranks; leaves entire.... 16. *Blechum*

1. DICLIPTERA Jussieu

Erect branched herbs. Leaves ovate, entire. Flowers in axillary clusters, the bracts opposite, unequal, larger than the calyx. Flowers sessile, in pairs, one often much reduced, the bracteoles as long as the calyx. Calyx-limb 5-parted, the segments equal, linear-lanceolate. Corolla pink, the tube slender, the limb deeply 2-lipped, the upper lip entire or emarginate, the lower 3-lobed, recurved. Stamens 2; anthers 2-celled, the cells blunt, superposed. Ovary 4-ovuled. Capsule clavate. (Greek, referring to the 2 bracts concealing calyx.)

Species about 60 in the tropics of both hemispheres, 2 or 3 in the Philippines.

1. **D. leonotis** Dalz.

An erect or spreading, branched, somewhat hairy herb about 0.5 m high. Leaves ovate to elliptic-ovate, sharply acuminate, 3 to 8 cm long, glabrous or with few hairs. Flowers in rather dense axillary whorls. Bracts green, lanceolate, narrowed below, 10 to 12 mm long, clothed with spreading white hairs, slenderly and sharply long-acuminate. Calyx about 5 mm long. Corolla pink, about 1 cm long.

Near San Pedro Macati, rare, fl. Jan., and probably in other months; of very local occurrence in the Philippines. India.

2. ELYTRARIA Vahl

Low, simple or branched, erect herbs, the leaves all basal or somewhat crowded near the ends of the stems or branches. Flowers small, white or purplish, sessile, solitary in the axils of the bracts, arranged in cylindric, slender spikes, the peduncles axillary, solitary, bearing from 1 to several spikes at their apices, covered with appressed, small, green bracts. Calyx 4-parted, the lobes unequal, acuminate. Corolla-tube cylindric, slender, the limb 2-lipped. Stamens 2, inserted near the throat, included, capsule oblong-linear, contracted at the base. Seeds small, few. (Greek "covering," in allusion to the scale-like bracts.)

Species 3 or 4, or according to some authors 15, in tropical and subtemperate America, some introduced in other tropical countries, a single one in the Philippines.

1. **E. TRIDENTATA** Vahl.

An erect, simple or branched, glabrous or slightly pubescent herb, 15 to 40 cm high. Leaves oblanceolate, usually somewhat crowded toward the ends of the stems or branches, 6 to 11 cm long, acute or acuminate, slightly toothed. Spikes 2 to 6 cm long, solitary or several at the ends of the elongated peduncles, the peduncles slender, stiff, axillary, covered with appressed, lanceolate, acuminate, bracts. Bracts subtending the flowers acuminate, imbricate, 3-toothed, about 4 mm long, their margins lanate. Corolla pink, slender, about 2.5 mm long.

In dry open places, fl. Sept.–March; apparently of local occurence in the Philippines, but thoroughly naturalized. A native of tropical America, but reported from no other part of the Orient.

3. JUSTICIA Linnaeus

Herbs or shrubs with entire leaves and usually small flowers in rather dense terminal or axillary spikes, the bracts large or small, bracteoles linear or wanting. Calyx 4- or 5-parted, the lobes narrow. Corolla-tube usually short, the limb spreading, 2-lipped, lower lip 3-lobed or nearly entire. Stamens 2; filaments hairy near the base. Ovary 4-ovuled; style filiform. Capsule ovoid or ellipsoid, 4-seeded from the base, or base narrowed and seedless. (In honor of J. Justice, a Scotch horticulturist.)

Species about 250 in all tropical countries, 6 or 7 in the Philippines.

An erect shrub.. 1. *J. gendarussa*
A slender, prostrate or spreading herb........................ 2. *J. procumbens*

1. **J. gendarussa** L.

An erect, branched, glabrous shrub 0.8 to 1.5 m high. Leaves lanceolate, acuminate, 7 to 14 cm long. Spikes terminal and in the upper axils, 4 to 12 cm long, the flowers clustered, the lower cluster often distant. Calyx-teeth linear, about 3 mm long. Corolla 1.5 cm long, white or pink with purple spots. Capsule about 12 mm long, glabrous, clavate. (Fl. Filip. *pl. 80, Dianthera subserrata.*)

In open waste places, hedges etc., fl. Dec.–Feb., and probably in other months; widely distributed in the Philippines, certainly indigenous. India to China and Malaya, often, perhaps, cultivated only.

2. **J. procumbens** L.

A slender, often tufted, prostrate or ascending, branched annual, the stems 10 to 40 cm long, slightly strigose or nearly glabrous. Leaves elliptic to oblong-ovate, petioled, 1 to 2 cm long, obtuse. Spikes terminal, 1 to 5 cm long, about 5 mm in diameter, rather dense. Flowers pink, 6 to 7 mm long, the bracts and calyx-teeth green, linear-lanceolate, hirsute. Capsule slightly pubescent, about 4 mm long.

In grass lands, Masambong, fl. Aug.–Sept.; widely distributed in the Philippines. India, through Malaya to Australia.

4. BARLERIA Linnaeus

Herbs or small shrubs, spiny or not. Leaves opposite, entire. Flowers rather large, yellow, purplish, or white, solitary or spicate. Sepals 4, in opposite pairs, the outer pair much the larger, the anterior one often emarginate, bifid, or 2-lobed. Corolla-tube elongated, enlarged upward, the lobes 5, sub-equal. Perfect stamens 2, 2 or 3, very small, rudimentary ones also present. Disk large. Ovary with 4 ovules; style long, shortly bifid or subentire. Capsule ovoid or oblong, 2- or 4-seeded below the middle. (In honor of J. Barrelier, a French botanist.)

Species about 60, mostly in the tropics of the Old World, 3 introduced in the Philippines.

1. Spiny plants with yellow flowers.
  2. Leaves linear-lanceolate; flowers in dense cone-like, cylindric spikes. 1. *B. lupulina*
  2. Leaves elliptic to elliptic-ovate........................ 2. *B. prionitis*
1. Spineless; flowers white and violet........................ 3. *B. cristata*

*1. R. LUPULINA Lindl.

A spreading, branched, shrubby plant 1 to 1.5 m high, branches purplish, armed at the nodes with slender, 1 to 2 cm long spines. Leaves lanceolate to linear-lanceolate, acute or apiculate-acuminate, 4 to 12 cm long, the midrib usually reddish or yellowish. Inflorescence a terminal, cylindric, cone-like spike, 5 to 7 cm long, about 2 cm thick, the bracts ovate, imbricate 1.5 to 2 cm long, persistent. Corolla yellow, 4 cm long.

Cultivated, Singalon, Cementerio del Norte, etc., fl. Jan.–March. A native of Mauritius, cultivated and spontaneous in many other tropical countries, and of very recent introduction here.

2. B. PRIONITIS L. Colinta, Culanta (Tag.).

An erect, glabrous, branched shrub 1 to 2 m high, with slender, axillary spines. Leaves elliptic to elliptic-ovate, narrowed at both ends, acuminate, 6 to 12 cm long. Flowers yellow, axillary, the upper ones in spikes, the bracts and calyx green, the outer bract usually foliaceous. Corolla about 4 cm long (Fl. Filip. *pl. 214.*)

In thickets, Masambong, Pasay etc., fl. Oct.–Apr.; of local occurrence in the Philippines, probably of prehistoric introduction. Tropical Asia and Africa.

*3. B. CRISTATA L. Violetas (Sp.-Fil.).

An erect, unarmed, much-branched shrub 1 to 3 m high, the branches sparingly pubescent. Leaves oblong to elliptic, acute, 4 to 10 cm long, somewhat pubescent beneath. Flowers in the upper axils and terminal, solitary or in pairs, the bracteoles linear. Outer 2 sepals green, ovate-lanceolate, nearly 2 cm long, persistent, laciniate-toothed. Corolla 6 to 7 cm long, the tube slender, winged above, the limb 4 to 5 cm in diameter, violet or nearly white, or streaked with violet and white. (F. Filip. *pl. 214.*)

Commonly cultivated, especialy as a hedge plant, fl. all the year. A native of India, now cultivated in many tropical countries.

5. ODONTONEMA Nees

Erect shrubs with colored or variegated foliage, glabrous or nearly so. Leaves opposite, entire. Inflorescence terminal and axillary, of racemosely or spicately arranged fascicles or reduced cymes, the bracts and bracteoles small. Calyx short, somewhat 5-parted. Corolla-tube elongated, straight or nearly so, slightly enlarged above, the limb spreading, somewhat 2-lipped, the posterior lobe 2-fid, the anterior one 3-fid. Stamens 2, inserted above the middle of the corolla-tube, included; staminodes usually present. Style filiform; ovules 2 in each cell. Capsule oblong, base contracted into a long stipe. (From Greek "tooth" and "thread," in allusion to the staminodes.)

Species about 30 in tropical America, 1 introduced and cultivated in the Philippines.

*1. O. NITIDUM (Jacq.) O. Kuntze.

An erect, branched, glabrous shrub 1 to 3 m high. Leaves pale-green variegated with white, or nearly uniformly dark-purplish, entire or obscurely undulate-lobed, oblong-ovate, acute or acuminate at both ends, 6 to 20 cm long. Inflorescence terminal and in the upper axils, green or purple, narrow, 8 to 16 cm long, the flowers fascicled or in reduced, spicately arranged cymes. Corolla purple or nearly white, the throat and basal parts of the lobes blotched and spoted with purple, the tube 12 to 15 mm long, the limb 1.5 to 2 cm in diameter.

Commonly cultivated for its ornamental foliage, both the purple-leaved form and the pale-green and white one frequent, fl. all the year, but apparently producing no fruits here. A native of tropical America, its time of introduction here uncertain, but probably comparatively recent.

6. PSEUDERANTHEMUM Radlkofer

Erect herbs or undershrubs, the leaves entire or coarsely toothed. Inflorescence spicate, racemose, or cymose, axillary or terminal, few-flowered, the flowers 1 to 3 in the axils of small, linear bracts. Calyx lobes 5, narrow. Corolla-tube long, slender, cylindric, the limb somewhat 1-lipped, lobes 5, spreading, subequal, or the 2 posterior ones somewhat smaller than the others. Stamens 2, inserted on the tube; staminodes 2. Ovules 2 in each cell. Capsule long-stalked. Seeds 4 or less. (Greek "false" and *Eranthemum*, an allied genus.)

Species about 60 in all tropical countries, 1 or 2 in the Philippines.

1. **P. pulchellum** (Hort.) Merr. (*P. bicolor* Radlk.; *Eranthemum bicolor* Schrank). Cinco llagas (Sp.-Fil.).

An erect, branched, rather slender undershrub or suffrutescent plant usually about 1 m high, nearly glabrous or somewhat pubescent. Leaves thin, elliptic-ovate to oblong-ovate or oblong-lanceolate, 5 to 12 cm long, the upper ones often much reduced, acute or acuminate, base decurrent. Peduncles axillary, longer than the petioles, bearing near their apices 1 to 3 or more racemose or cymose flowers. Calyx green, 5 to 7 mm long, the teeth elongated linear. Corolla white, middle lobe of the lower lip with a large purple spot at the base, the tube slender, 2.5 to 3 cm long, the lobes spreading, elliptic to elliptic-oblong, about 1.2 cm long. Capsule pubescent, 2 cm long, stalked. (Fl. Filip. *pl. 9, Justicia gendarussa.*)

In dry thickets, Masambong, near Fort McKinley, etc., fl. Oct.–Apr.; widely distributed in the Philippines. Malaya.

7. RHINACANTHUS Nees

Erect branched shrubs with entire leaves. Inflorescence terminal, of divaricate panicled cymes, few-flowered. Flowers solitary or in groups of 2 or 3, sessile, the bracts and bracteoles linear-lanceolate, small. Calyx small, 5-lobed or -partite, the segments linear-lanceolate. Corolla white, the tube long, slender, the limb spreading, 2-lipped, the upper lip small, lanceolate, entire or 2-toothed, curved or twisted, the lower broad, 3-lobed. Stamens 2, inserted near the top of the corolla-tube. Capsule clavate, 4-seeded, long-stalked. (Greek "nose" and *Acanthus*, another genus of this family.)

Species 4, tropical Asia and Africa, a single one in the Philippines.

1. **R. NASUTA** (L.) Kurz. (*R. communis* Nees). Cinco llagas na puti, Sili-silihan, Tagac-tagac (Tag.).

A slender, erect, branched, somewhat pubescent shrub 1 to 2 m high. Leaves oblong, narrowed at both ends, obtuse or acute, 4 to 10 cm long. Inflorescence a spreading, leafy, pubescent panicle, the flowers usually clustered. Calyx green, pubescent, 5 mm long. Corolla-tube slender, cylindric, greenish, 2 cm long, the upper lip white, erect, oblong or lanceolate, 2-toothed at the apex, about 3 mm wide, long, the lower lip broadly obovate, 11 to 13 mm long, and wide, 3-lobed, white, with few minute brownish dots near the base. (Fl. Filip. *pl. 10.*)

Common in thickets and hedges, fl. Dec.–March; certainly an introduced plant in the Philippines, although now widely distributed in and about towns. India to Madagascar and Malaya, but frequently only cultivated.

8. GRAPTOPHYLLUM Nees

Erect glabrous shrubs with purple or variegated leaves. Inflorescence terminal, paniculate, the flowers pedicelled, arranged in few-flowered clusters, the bracts and bracteoles small. Calyx small, 5-parted, the lobes equal, linear-lanceolate. Corolla elongated, the tube inflated upward, the limb very oblique, 2-lipped, the upper lip shortly 2-fid, the lower one 3-lobed. Stamens 2; staminodes 2, small. Ovary 4-ovuled. Capsule oblong, hard, long-stalked. (From the Greek "writing" and "leaves," in allusion to the variously marked leaves.)

A small genus of about 4 Australian and Polynesian species, 1 commonly cultivated.

* 1. G. PICTUM (L.) Griff. (*G. hortense* Nees). Morado (Sp.-Fil.); Sarasa, Balasbas (Tag.).

An erect branched shrub 2 to 3.5 m high, glabrous throughout. Leaves opposite, entire, oblong to broadly elliptic, narrowed at both ends, somewhat acuminate, shortly petioled, 10 to 20 cm long, dull-purple, or green and variously mottled with white or gray. Inflorescence 6 to 12 cm long. Corolla dull-purple or reddish-purple, about 4 cm long. (Fl. Filip. *pl. 7, 8.*)

Commonly cultivated for its ornamental foliage, and in hedgerows etc., fl. most of the year; in and about towns troughout the Philippines, but not spontaneous. Probably a native of Polynesia, now cultivated in most tropical countries.

The form called "Morado"; with dull, brownish-purple leaves is the more common; another frequent form has its leaves green, blotched along the midrib with white.

9. THUNBERGIA Linnaeus fils

Scandent herbaceous or somewhat woody vines, or erect shrubs. Leaves often cordate, angular or hastate. Flowers axillary, solitary or in pairs, or racemose, the bracts at the base of the pedicels leaf-like, the bracteoles large, coherent by their margins at least when young. Calyx small, anular, 10- to 16-toothed, often obscure. Corolla large, the tube ventricose, curved, the lobes 5, rounded. Stamens 4, in 2 pairs, near the base of the corolla-tube. Disk cushion-shaped or annular. Style long. Capsules globose, abruptly narrowed into an elongated, empty beak. Seeds 2 in each cell. (In honor of C. P. Thunberg, a Swedish botanist.)

Species about 75 chiefly in Africa and Asia, some in Malaya and Australia, 4 or 5 in the Philippines, mostly introduced.

1. Vines.
    2. Flowers pale-blue or purplish, large .... 1. *T. grandiflora*
    2. Flowers yellow, with or without a dark-purple center .... 2. *T. alata*
    2. Flowers white .... 3. *T. fragrans*
1. Erect shrubs; leaves rounded or acute at the base; flowers violet-purple. 4. *T. erecta*

*1. T GRANDIFLORA (Rottb. & Willd.) Roxb.

A large, coarse, somewhat woody vine. Leaves opposite, broadly ovate, 6 to 18 cm long and wide, somewhat pubescent, angularly broadly lobed, base prominently cordate. Flower large, axillary, pedicelled, solitary, or in long, pendulous racemes, the bracteoles ovate, 3 cm long, enclosing the buds, deciduous. Calyx a narrow ring. Corolla about 8 cm long, very pale-blue or nearly white outside, the upper surface of the lobes pale-blue-purple, the tube constricted above the ovary, then expanded, the limb 8 cm broad, spreading. Filaments widened below; anthers bearded. (Fl. Filip. *pl. 229.*)

Commonly cultivated in Manila and in many of the larger towns of the Archipelago, fl. throughout the year, but apparently producing no seeds in our area. A native of India, now cultivated in many tropical and subtropical countries.

2. T. ALATA Bojer.

A slender, herbaceous vine, more or less pubescent. Leaves ovate-cordate, acute, 4 to 10 cm long, the petioles prominently winged, 1 to 7 cm long. Flowers axillary, solitary, peduncled, the bracteoles ovate, green, 2 cm long, somewhat keeled in the lower one-half. Corolla pale-yellow with a whitish center, or darker-yellow and with a dark-purple center, the limb 3 to 4 cm in diameter. Capsule depressed-globose, about 8 mm thick, the beak stout, about 1 cm long.

In thickets, occasional, fl. Oct.–Dec.; local in Luzon, and of recent introduction, but thoroughly naturalized. A native of Africa, now found in India and Malaya.

3. **T. fragrans** Roxb.

A slender, glabrous or nearly glabrous, herbaceous vine reaching a height of 2 to 3 m or more. Leaves 5 to 10 cm long, oblong-ovate to oblong-lanceolate, acuminate, base rounded, cordate, or hastate, sometimes toothed, the basal lobes if any, acute. Flowers axillary, solitary, pedicelled. Bracteoles green 1.5 to 2 cm long. Calyx short, toothed. Corolla white, 3 to 4 cm long, the tube slender. Capsule 2 to 2.5 cm long, glabrous, shining.

In thickets Pasay, fl. most of the year; widely distributed in the Philippines. India to northern Australia.

*4. T. ERECTA (Benth.) And.

An erect, branched, glabrous shrub 1 to 2 m high, with slender, 4-angled stems. Leaves ovate to elliptic-ovate, 1 to 3.5 cm long, entire or slightly angular-lobed, acute or acuminate. Flowers axillary, solitary, the bracts green, 1 cm long. Corolla-tube about 5 cm long, white, slender and constricted below, inflated and about 1 cm in diameter above, the lobes spreading, white or deep violet-purple, the limb 3 to 4 cm in diameter.

Somewhat cultivated, fl. all the year. A native of tropical Africa, of very recent introduction in the Philippines.

10. **STAUROGYNE** Wallich

Erect herbs with opposite leaves which are entire or nearly so. Inflorescence of terminal or axillary spikes or racemes, dense or lax, the bracts leaf-like, or small and inconspicuous, the bracteoles 2 near the base of the calyx, smaller than the bracts. Sepals 5, oblong to linear, one larger than the other, or subequal. Corolla-tube cylindric, the lobes 5, spreading, short. Stamens 4, in 2 pairs, the filaments hairy; anther-cells spreading. Ovules very many. Capsule oblong, not stalked, bearing seeds from the base to the apex. Seeds numerous in each cell, seated on minute papillae. (Greek "cross" and "woman" in reference to the bifid plates on the stigmas of some species.)

Species 45 or 50 in tropical Asia, Malaya, Australia, and Brazil, 2 or 3 in the Philippines.

1. **S. rivularis** Merr.

A slender, erect plant 10 to 30 cm high, usually branched from the base, the younger parts glandular-pubescent. Stems brownish-purple. Leaves subsessile, narrowly obovate to oblanceolate, 2 to 6 cm long, acute or obtuse, base narrowed, margins entire or obscurely crenate-undulate. Flowers axillary and in terminal spikes or spike-like racemes, the bracts, bracteoles and sepals green, the bracts narrowly oblong-obovate, the bracteoles lanceolate, one calyx-lobe much broader than the other four. Corolla 7 to 9 mm long, cylindric, pale-purple with darker lines. Capsule oblong, 5 mm long, 2-celled, many-seeded, not stalked.

On ledges along small streams, Masambong, fl. Nov.–Feb. A species known only from this locality.

11. ACANTHUS Linnaeus

Erect or ascending shrubby plants. Leaves sinuous, sharply toothed, often spiny. Spikes terminal, dense or interrupted; bracts ovate, rather large, the bracteoles similar but smaller. Flowers subsessile, blue or white. Sepals 4, 2 outer opposite, 2 inner opposite, smaller. Corolla-tube short, ovoid, the upper lip obsolete, the lower one large, broad, shortly 3-lobed or 3-toothed. Stamens 4, in 2 pairs, shorter than the lip; filaments short, stout, curved below the anther; anthers oblong, 1-celled, bearded. Ovary 4-ovuled; style shortly 2-fid. Fruit an ellipsoid, compressed, shining, 4-seeded capsule. Seeds compressed, orbicular. (Greek "spiny," in reference to the spiny leaves of some species.)

Species about 20, warm-temperate and tropical parts of the Old World, a single species in the Philippines.

1. **A. ilicifolius** L. Diliuario, Doloariu (Tag.).

An erect or ascending, slightly branched shrub 0.5 to 1.5 m high; the stems round, greenish, with a pair of short, sharp spines at the base of each petiole. Leaves rigid, coriaceous, green and shining, oblong to oblong-lanceolate, 9 to 14 cm long, sinuate-toothed, the teeth spinous; petioles 1 cm long or less. Spikes terminal, dense or interrupted, solitary. Flowers about 4 cm long, each subtended by an ovate, green, closely appressed bract 7 to 8 mm long, and 2 similar but smaller bracteoles. Calyx green, 10 to 12 mm long. Corolla-tube 1 cm long, the lower lip pale-blue, spreading or recurved, about 3 cm long, 2.5 cm wide, pubescent within. Capsule 2 to 2.5 cm long. (Fl. Filip. *pl. 153.*)

In low wet lands near the sea, subject to the influence of salt water; throughout the Philippines along tidal streams, etc. India, through Malaya to Australia.

12. LEPIDAGATHIS Willdenow

Herbs, glabrous or pubescent, erect or spreading. Flowers small, in terminal or lateral often fascicled heads or dense spikes. Bracts usually larger than the calyx-segments and similar to them, bracteoles narrower. Calyx 5-lobed, the 2 anterior lobes more or less connate. Corolla small, tubular, inflated above, 2-lipped. Stamens 4, in 2 pairs. Capsule 2- or 4-seeded. (Greek "scale" and a "ball of string," in allusion to the crowded bracteate flowers.)

Species 50 or more, chiefly in the tropics of the Old World, about 15 in the Philippines.

1. **L. secunda** (Blanco) Nees.

An erect or spreading, slender, slightly pubescent herb 20 to 40 cm high. Leaves 2 to 7 cm long, ovate to ovate-lanceolate, acuminate, in pairs, one of each pair long-petioled. Spikes ovoid, dense, solitary or fascicled, 1 cm long or less, many-flowered. Bracts and calyx-lobes green, acuminate. Corolla pink-purple, about 6 mm long.

In open dry places, La Loma to San Pedro Macati, fl. Jan.–Apr.; of local occurrence in the Philippines. Endemic.

13. HYGROPHILA R. Brown

Herbs with lanceolate to obovate, entire, opposite leaves, the flowers sessile, axillary, fasciculate, the bracts elliptic to lanceolate, the bracteoles shorter than the calyx. Calyx tubular, 5-fid. Corolla pale-blue or purplish, the tube enlarged above, 2-lipped, straight. Stamens 4, in 2 pairs, the posterior ones similar to the others, or shorter, or rudimentary. Ovary oblong. Capsule oblong to linear, seed-bearing throughout. Seeds very numerous. (Greek "moist" and "to love" in reference to most species growing in swampy places.)

Species about 30, in most tropical and subtropical countries, 3 or 4 in the Philippines.

Erect, branched, nearly glabrous; leaves mostly oblong to lanceolate. 1. *H. angustifolia*

Spreading, rather densely hairy; leaves obovate to oblong-obovate. 2. *H. phlomoides*

1. **H. angustifolia** R. Br.

An erect, rather stout, branched herb 0.5 to 1 m high, glabrous or nearly so. Leaves oblong to lanceolate or even somewhat oblong-obovate, 3 to 10 cm long, margins slightly ciliate. Flowers in rather dense axillary whorls. Calyx green, cylindric, 8 mm long, the lobes 5, lanceolate. Corolla pale-purplish, 1.5 cm long, inflated upward, 2-lipped. Fertile stamens 4. Capsules cylindric, glabrous, about 1.5 cm long, 2 mm in diameter, a little longer than the accrescent calyx. (Fl. Filip. *pl. 363.*)

In open wet grass lands, fl. Nov.–Apr.; widely distributed in the Philippines. Tropical Asia, Malaya, and Australia.

2. **H. phlomoides** (Wall.) Nees var. **roxburghii** C. B. Clarke.

A decumbent or spreading, hairy, more or less branched plant, 20 to 50 cm long, the flowering branches ascending. Leaves obovate to narrowly oblong-obovate, 1.5 to 4.5 cm long, obtuse. Flowers axillary, solitary or fascicled. Calyx green, about 8 mm long, divided one-third to one-half way down into 5, lanceolate, acuminate teeth. Corolla pale-purplish, about 2 cm long. Capsules hairy, oblong-cylindric, 10 to 12 mm long.

In open damp places, old rice paddies etc., fl. Nov.–March; widely distributed in Luzon. India.

14. RUELLIA Linnaeus

Herbs with opposite entire leaves. Flowers sessile, axillary, solitary, the bracteoles large, longer than the calyx, bracts none. Calyx 5-fid, the teeth very narrow. Corolla tubular, enlarged and ventricose above, the limb somewhat oblique, lobes subequal. Stamens 4, in 2 pairs. Ovary glabrous, ovules 3 to 10 in each cell. Capsule clavate, base narrowed, solid, cylindric, seed-bearing above. Seeds 6 or more. (In honor of J. Ruellie or Ruel, a French botanist.)

Species about 200, in all warm regions, 2 or 3 in the Philippines.

1. **R. repens** L.

A slender, spreading or ascending, branched, somewhat hairy or nearly glabrous herb 20 to 50 cm in length. Leaves lanceolate to ovate-lanceolate, acuminate, 2 to 5 cm long, with few, scattered, strigose hairs. Bracteoles leaf-like, oblong to spatulate, 1 to 1.5 cm long. Calyx about 5 mm long, the lobes linear. Corolla white or very pale-blue, 1.2 to 1.5 cm long, slightly hairy externally. Capsule hairy or nearly glabrous, about 1 cm long.

In open places and borders of thickets, Caloocan, Pasay, etc., fl. June-Dec.; widely distributed in the Philippines. Siam to China and Malaya.

15. HEMIGRAPHIS Nees

Erect or prostrate herbs with opposite, toothed or entire leaves. Flowers in terminal spikes, the bracts large, imbricate, each usually with but 1 flower, the bracteoles small and narrow or none. Calyx 5-partite. Corolla tubular, cylindric below, swollen above, pale-blue or purplish, the lobes 5. Stamens 4, in 2 pairs, included. Capsule linear to linear-oblong, 4- to 20-seeded. (Greek "half" and "stylus.")

Species about 30, India to Japan and Malaya, about 12 in the Philippines.

Plant purple, cultivated only; leaves ovate; corolla about 1.8 cm long. 1. *H. colorata*
Plant green; leaves elliptic-oblong; corolla about 12 mm long.. 2. *H. reptans*

*1. H. COLORATA (Bl.) Hallier f.

A spreading or ascending, simple or sparingly branched, nearly glabrous herb, the stems prostrate and rooting at the lower nodes, all parts of the plant purple or purplish, the lower surfaces of the leaves uniformly so. Leaves ovate, 4 to 9 cm long, crenate, base broad, cordate, apex acute or blunt, the petioles up to 6 cm in length. Spikes terminal or in the upper axils, peduncled, 2 to 3.5 cm long, the bracts oblong to lanceolate, dark-purple, 1 to 1.5 cm long. Calyx 8 to 10 mm long, purple, the lobes 5, linear-lanceolate, acuminate. Corolla white, with few, slender, purplish lines, about 1.8 cm long, the tube slender below, much inflated above.

Frequently cultivated as a border plant, fl. all the year. A native of Malaya, introduced and cultivated only.

2. **H. reptans** (Forst.) T. And., var. **primulifolia** (Nees) Hallier f.

A spreading herb, the stems somewhat pubescent, rather slender, often rooting at the nodes, the flowering branches erect or ascending, 6 to 15 cm high. Leaves elliptic-oblong to ovate-oblong, 4 to 8 cm long, obtuse or rounded, base cordate, margins crenate, somewhat pale on the lower surface. Spikes terminal, 1 to 3 cm long, the bracts green, persistent, oblong-oblanceolate or spatulate, 8 to 16 mm long. Flowers 1 or sometimes 2 in the axil of each bract. Calyx green, deeply cleft into 5 narrowly lanceolate lobes. Corolla 10 to 12 mm long, pale-straw-colored or white, with faint purplish lines, the tube slender below, enlarged above, the limb about 7 mm in diameter. Capsule 7 to 8 mm long.

On ledges along small streams, Masambong, and in gardens, Singalon, fl. Nov.–Dec.; widely distributed in the Philippines. An endemic form of the Malayan *H. reptans* T. And.

16. BLECHUM P. Browne

Branched herbs, glabrous or hairy, with entire leaves. Flowers small, solitary or in pairs in the axils of large foliaceous bracts, arranged in dense terminal spikes. Calyx 5-parted, the segments narrow. Corolla-tube slender, straight or curved, somewhat enlarged above, the limb of 5, spreading, subequal lobes. Stamens 4, in 2 pairs, inserted above the middle of the corolla-tube. Ovules 3 to many in each cell. Capsules ovate to orbicular, base shortly contracted. Seeds usually many.

Species 4 or more in tropical America, 1 introduced in the Philippines and in some other tropical countries.

1. B. **BROWNEI** Juss.

An erect or ascending herb, the stems often prostrate and rooting below, 20 to 50 cm high, sparingly hairy or nearly glabrous. Leaves thin, ovate, 5 to 10 cm long, entire or nearly so, acute, base decurrent-acuminate. Inflorescence terminal, spike-like, the flowers mostly in pairs, each pair subtended by a leaf-like, ovate, persistent, 1 to 1.5 cm long bract and two smaller bracteoles. Flowers small, white. Calyx 4 to 5 mm long, hairy, 5-lobed, the lobes linear. Corolla white, tubular, hairy, slightly curved, about 1.3 cm long, slightly exserted from the bracts. Capsule ovoid, acuminate, somewhat compressed, about 6 mm long.

In waste places, roadsides, etc., common, fl. all the year; widely distributed in the Philippines. A native of tropical America, now naturalized in the Philippines, Formosa, Marianne Islands, etc.

130. PLANTAGINACEAE (PLANTAIN FAMILY)

Herbs with usually radical leaves, the flowers small, greenish, often dimorphous, in spicate scapes. Sepals 4, imbricate in bud, persistent. Corolla hypogynous, salver-slaped, scarious, the lobes 4, imbricate in bud. Stamens 4, on the corolla-tube; filaments slender, inflexed in bud, persistent; anthers large, pendulous, versatile. Ovary free, 2- to 4-celled; style filiform, with 2 lines of stigmatic hairs; ovules solitary and basal, or several. Fruit a 1- to 4-celled capsule, circumsciss, thin, with 1 or more seeds. Seeds small, usually peltate, testa thin, albumen fleshy; embryo cylindric, transverse.

Genera 3, species over 200, represented in the Philippines only by the following introduced genus and species.

PLANTAGO Linnaeus

Characters of the Family as given above. (The Latin name.)

1. P. **MAJOR** L. Lantin (Sp.-Fil., corruption of Sp. *llanten*); Plantain.

A perennial herb, the leaves all radical, petioled, entire or obscurely toothed, oblong or oblong-ovate, 5 to 10 cm long, about 5-nerved, the petiole often as long as the leaf-blade. Spikes 6 to 12 cm long, erect, slender, the flowers usually crowded, the bracts small. Corolla small, the lobes spreading or reflexed. Capsules ovoid, about 3 mm long. Seed 8 to 16, angular. (Fl. Filip. *pl. 20, P. media.*)

Occasional in gardens, rarely in waste places, fl. Jan.–March. Introduced from Europe by the Spaniards, now naturalized in some localities in Luzon.

131. RUBIACEAE (COFFEE FAMILY)

Annual or perennial herbs, or shrubs, or trees, sometimes climbing, occasionally spiny. Leaves simple, entire, opposite, stipulate. Flowers axillary or terminal, solitary, fascicled, or variously paniculate or cymose, sometimes in dense globose heads. Flowers regular, perfect or 1-sexual. Calyx-tube adnate to the ovary, the limb entire or 4- or 5-lobed. Corolla regular, usually 4- or 5-lobed, the tube long or short. Stamens as many as the corolla-lobes, inserted on the corolla-tube or at its mouth. Ovary inferior, usually 2-celled, rarely 1-celled; style simple or cleft; ovules 1 or more in each cell. Fruit usually 2-celled, berry-like, capsular, or drupaceous, or of dehiscent or indehiscent cocci. Seeds various.

Genera about 400, species over 5,500, chiefly tropical and subtropical, 55 genera and about 300 species in the Philippines.

1. Ovules few to many in each cell.
  2. Flowers in dense globose heads.
    3. Ovaries confluent; fruits forming a fleshy mass, flowers ebracteolate .... 1. *Sarcocephalus*
    3. Ovaries free or nearly so; fruits free, dry, capsule-like; flowers bracteolate .... 2. *Mitragyna*
  2. Flowers not in dense globose heads.
    3. Herbs.
      4. Corolla-lobes toothed; fruit indehiscent .... 3. *Dentella*
      4. Corolla-lobes entire; fruit a loculicidal capsule .... 4. *Oldenlandia*
    3. Shrub or trees.
      4. Corolla-lobes valvate; one lobe of the calyx much-enlarged as a white, leaf-like appendage .... 5. *Mussaenda*
      4. Calyx-lobes twisted-imbricate; calyx-lobes all equal, not enlarged.
        5. Style fusiform.
          6. Ovary 1-celled .... 6. *Gardenia*
          6. Ovary 2-celled .... 7. *Randia*
        5. Style cleft .... 8. *Hypobatherum*
1. Ovules solitary in each cell.
  2. Erect shrubs or small trees.
    3. Ovary 4- to 9-celled .... 9. *Guettarda*
    3. Ovary 2-celled.
      4. Corolla-lobes twisted in bud.
        5. Flowers axillary, fascicled or solitary .... 10. *Coffea*
        5. Flowers panicled or corymbose.
          6. Flowers usually 4-merous; style not much exserted .... 11. *Ixora*
          6. Flower 5-merous; style long-exserted .... 12. *Pavetta*
      4. Corolla-lobes valvate in bud.
        5. Flowers capitate, the calyx-tubes coherent .... 13. *Morinda*
        5. Flowers not capitate, free, solitary, fascicled, or cymose.
          6. Flowers in terminal corymbose cymes; unarmed shrubs or small trees .... 14. *Psychotria*
          6. Flowers axillary, solitary; spiny shrubs .... 15. *Plectronia*
1. Herbs, spreading, erect, or climbing.
  2. Twining herbaceous vines with rank-scented leaves; flowers in paniculate cymes .... 16. *Paederia*
  2. Spreading or ascending branched herbs with 4-angled stems, and small, axillary, fascicled flowers .... 17. *Spermacoce*

Nauclea L.

(1. SARCOCEPHALUS Afzelius)

Trees with opposite leaves, the stipules usually large. Flowers numerous, axillary or terminal, peduncled, globose heads, united by their confluent calyx-tubes, the bracts 2, deciduous, the bracteoles none. Calyx 4- to 6-toothed. Corolla-tube long, slender, funnel-shaped, 5- or 6-lobed. Anthers 5 or 6, sessile at the corolla-mouth. Ovary 2-celled; style exserted, filiform; ovules numerous. Fruit of numerous 2-celled pyrenes combined in a fleshy globose mass. (Greek "flesh" and "head," in allusion to the fleshy globose fruit.)

Species about 15, tropical Africa and Asia to Australia and Polynesia, about 4 in the Philippines.

N. orientalis L.

1. (**S. orientalis** (L.) Merr.) (*S. cordatus* Miq.). Bancal (Tag., Vis., Pamp.).

A glabrous tree 7 to 16 m high. Leaves elliptic to oblong-ovate, coriaceous, obtuse, base cordate or rounded, 11 to 25 cm long, the stipules green, ovate to elliptic, 1.5 to 3 cm long. Heads terminal, peduncled, solitary, 4 to 5 cm in diameter, the flowers white. (Fl. Filip. *pl. 51, Nauclea glaberrima.*)

Occasional in thickets, sometimes cultivated, fl. Sept.–May; widely distributed in the Philippines. India and Malaya to Australia.

2. MITRAGYNA Korthals

Shrubs or trees with large caducous stipules, the leaves prominently nerved. Flowers in dense, globose, peduncled, axillary and terminal heads which are sometimes panicled, each peduncle with 2 deformed leaves at the top. Calyx-tubes short, confluent, the limb truncate or 5-toothed. Corolla funnel-shaped, the tube slender, long, lobes 5, short, valvate. Stamens 5. Ovary 2-celled; style filiform; ovules numerous, imbricate on pendulous placentae. Fruit of many, dry, dehiscent, many-seeded cocci, all in a globose head. (Greek "miter" and "female.")

Species about 10 in tropical Africa and Asia, 2 in the Philippines.

1. **M. rotundifolia** (Roxb.) O. Kuntze (*M. diversifolia* Havil.). Mambog (Tag.).

A shrub or small tree 2 to 8 m high, slightly pubescent or nearly glabrous. Leaves broadly ovate to elliptic-ovate, 5 to 12 cm long, obscurely and shortly acuminate, the lower ones larger than the upper ones, often subcordate, the nerves prominent, suboblique. Heads in spreading trichotomous panicles, the middle one subsessile, the lateral ones peduncled, about 2 cm in diameter. Flowers fragrant, white, soon turning yellowish.

Occasional in thickets, La Loma, fl. June–Sept.; widely distributed in Luzon. Chittagong to Burma.

3. DENTELLA Forster

A small, slender, prostrate, branched, annual herb with small opposite leaves. Flowers small, white, axillary, sessile or short-pedicelled. Calyx-tube globose, the limb tubular, persistent. Corolla funnel-shaped, hairy inside, the lobes 5, 2- or 3-toothed. Stamens inserted in the middle of the tube, the filaments short. Ovary 2-celled, ovules many in each cell. Fruit a small, dry, indehiscent, many-seeded capsule. (Diminuitive of the Latin "tooth," from the toothed corolla-lobes.)

A monotypic genus.

1. **D. repens** (L.) Forst.

A prostrate, nearly or quite glabrous, somewhat succulent, slender, branched, herbaceous annual, rooting at the nodes. Leaves narrowly oblong-obovate to narrowly elliptic, 1 cm long or less. Flowers axillary, solitary, sessile, white, about 2 mm long. Capsule ovoid, about 4 mm long.

In open damp places, roadsides, etc., fl. most of the year; throughout the Philippines. India through Malaya to Australia and Polynesia.

4. OLDENLANDIA Linnaeus

Slender, erect or spreading, simple, diffusely or dichotomously branched herbs. Leaves narrow. Flowers small, white, axillary or terminal, solitary, or in few-flowered umbels or cymes. Calyx-teeth 4, rarely 5, usually erect. Corolla rotate, funnel- or salver-shaped, the tube long or short, 4- or 5-lobed. Ovary 2-celled; ovules numerous. Capsule small, membranaceous or chartaceous, loculicidal at the top, terete or angled. (In honor of H. B. Oldenland.)

Species 70 or more, tropical and subtropical, about 8 in the Philippines.

1. Leaves elliptic-ovate to oblong; calyx-teeth in fruit very small; flowers cymose........ 1. *O. biflora*
1. Leaves linear to linear-oblanceolate or lanceolate; calyx-teeth prominent.
    2. Flowers in axillary, few-flowered umbels........ 2. *O. corymbosa*
    2. Flowers axillary, solitary.
        3. Pedicels not or but little longer than the flowers........ 3. *O. diffusa*
        3. Pedicels much longer than the flowers.
            4. Erect, dichotomously branched, rather rigid; leaves 1 to 3 cm long. 4. *O. herbacea*
            4. Weak, ascending, usually unbranched; leaves less than 7 mm long. 5. *O. brachyphylla*

1. **O. biflora** L. (*O. paniculata* L.).

An annual glabrous herb, branched from the base, 6 to 30 cm high, the branches somewhat angled, ascending. Leaves shortly petioled, elliptic-ovate to oblong, acute or obtuse, 1 to 3 cm long, the nerves faint. Cymes in the upper axils, 3- to 7-flowered, somewhat panicled, the pedicels slender. Calyx green. Corolla white, small. Capsules cup-shaped or ovoid, about 3 mm long, crowned by the four small calyx-teeth.

In open waste places, grass lands, etc., possibly introduced, fl. all the year; throughout the Philippines. India to China, Malaya, and Polynesia.

2. **O. corymbosa** L.

An erect or spreading, branched, annual herb 20 to 50 cm in length. Leaves linear-oblanceolate to linear-oblong, 1.5 to 3 cm long. Flowers in axillary, peduncled, 2- to 5-flowered umbels, the peduncles slender, 5 to 10 mm long, the pedicels half as long or less, some solitary flowers often intermixed. Corolla small, white. Capsule turbinate, about 2 mm long, not protruded beyond the short acuminate calyx-lobes.

In open waste places etc., fl. all the year; throughout the Philippines, possibly introduced. Most tropical countries.

3. **O. diffusa** (Willd.) Roxb.

A slender, spreading or ascending, glabrous, more or less branched annual herb reaching a length of 50 cm or less. Leaves linear, 1 to 3 cm long. Flowers axillary, solitary, white, about 3 mm long, the pedicels about as long as the calyx. Capsule ovoid, about 4 mm long, not protruded beyond the calyx-segments.

In waste places, fl. most of the year; widely distributed in the Philippines, possibly introduced. India to Japan and Malaya.

4. **O. herbacea** L. (*O. heynii* R. Br.).

An erect, slender, rather rigid, dichotomously branched, annual herb 20 to 40 cm high, the stems 4-angled, internodes long. Leaves linear, very narrow, 1 to 3 cm long, sessile. Flowers axillary, solitary, white, about 5 mm long, the pedicels slender, 1 to 2 cm long. Capsule ovoid, about 3 mm long, the calyx-teeth lanceolate, short, the top of the capsule rounded, protruded beyond the calyx-segments.

In open grass lands, Masambong, fl. Oct.–Dec.; occasional in the Philippines. Tropical Africa, India, and Ceylon.

5. **O. brachyphylla** Merr.

A very slender, erect, weak, pale-green, simple or sparingly branched annual herb 4 to 25 cm high, glabrous or minutely scabrid, the stems obscurely 4-angled. Leaves lanceolate, sharply acuminate, 3 to 7 mm long, 1 to 1.8 mm wide, sessile, base scarcely narrowed; stipules very short, entire, a mere connecting membrane. Flowers axillary, solitary, their pedicels 8 to 10 mm long. Calyx green, 2.5 mm long, cleft about half way to the base into 4, lanceolate, acuminate teeth. Corolla white, the tube inflated, 2 mm long, slightly contracted at the mouth, lobes 4, spreading, broadly ovate, acute or obtuse, 1.6 mm long, throat villous. Capsule obovoid or ovoid, 2 mm long. Seeds numerous, small, black, pitted.

In old rice paddies and open wet grass lands, Caloocan to Masambong, fl. Oct.–Jan.; known only from the vicinity of Manila. Endemic.

5. MUSSAENDA Linnaeus

Shrubs or small trees, rarely climbing, with opposite leaves. Flowers yellow or white, in terminal cymes, the bracts and bracteoles deciduous. Calyx oblong, the lobes 5, usually deciduous, 1 usually persistent and much enlarged, forming a petioled, white, leaf-like appendage. Corolla tubular, slightly enlarged above, pubescent, the lobes 5, short, throat villous. Stamens 5, inserted at the throat or below. Ovary 2-celled, many-ovuled. Fruit fleshy, areolate at the top, with many small seeds. (From the Singalese name.)

Species 50 or more, tropical Africa to Asia and Polynesia, about 12 in the Philippines.

1. **M. philippica** L. C. Rich. (*M. grandiflora* Rolfe).

A shrub or small tree 3 to 5 m high, more or less pubescent or nearly glabrous. Leaves oblong-ovate to oblong-lanceolate, acuminate, 6 to 14 cm long, base acute; stipules about 4 mm long, 2-fid. Cymes terminal, rather open, pubescent, few-flowered. Calyx about 7 mm long, four of the teeth as long as the tube, one very much enlarged as a white, leaf-like, long-petioled, elliptic-ovate appendage, the lamina 4 to 8 cm long. Corolla yellow, pubescent, about 2 cm long, enlarged upward. Fruit about 1.5 cm long. (Fl. Filip. *pl. 58, M. frondosa.*)

In thickets, Masambong, fl. Aug.–Dec.; common and widely distributed in the Philippines, variable. Perhaps only the Philippine representative of the Indo-Malayan *Mussaenda frondosa* L.

6. GARDENIA Linnaeus

Erect shrubs or trees, sometimes spiny. Leaves opposite. Flowers often large and showy, fragrant, white, axillary or terminal, solitary or fascicled. Calyx-tube truncate, toothed, or lobed, sometimes winged. Corolla-tube long or short, cylindric or narrowly funnel-shaped, the lobes 5 to 12, spreading. Stamens as many as the corolla-lobes. Anthers linear, sessile. Ovary 1-celled; style stout, clavate, fusiform, or 2-cleft; ovules numerous on parietal placentae. Fruit ovoid, ellipsoid, or globose, coriaceous or fleshy, many-seeded. (In honor of A. Garden, an English physician.)

Species 60 or more, tropical and subtropical, about 5 in the Philippines.

*1. G. FLORIDA L. Rosal (Sp.-Fil.).

A glabrous, unarmed shrub usually about 1 m high. Leaves elliptic-ovate, narrowed at both ends, usually acute, shining, short-petioled, 2 to 6 cm long. Flowers large, very fragrant, solitary in the upper axils. Calyx green, the tube funnel-shaped, about 1.5 cm long, 5-angled or winged, the lobes linear, about as long as the tube. Corolla usually double, white, soon turning yellowish, about 5 cm long, 5 to 7 cm wide. (Fl. Filip. *pl. 154.*)

Commonly cultivated for its fragrant flowers, fl. June–Dec. A native of China and Japan, now widely cultivated in warm and tropical countries.

7. RANDIA Linnaeus

Shrubs or trees, sometimes climbing, often spiny. Leaves opposite, with one sometimes arrested; stipules short, free or connate. Inflorescence various, axillary, leaf-opposed, or terminal, the flowers sometimes solitary. Calyx-tube various, the limb often tubular, the lobes short or long, often leafy. Corolla funnel-shaped to bell-shaped, the tube long or short, throat glabrous or hairy; lobes 5, twisted in bud. Stamens 5, alternating with the lobes. Ovary 2-celled, rarely with 3 or 4 cells; style short or elongated; stigma usually fusiform; ovules many. Fruit fleshy, globose to ellipsoid, 2-celled, many-seeded. (In honor of Isaac Rand.)

Species 100 or more, all tropical, about 14 in the Philippines.

Spiny; flowers solitary	1. *R. spinosa*
Unarmed; flowers cymose	2. *R. cumingiana*

*1. R. SPINOSA (Thunb.) Blume (*R. dumetorum* Lam.).

An erect, branched shrub or small tree, up to 4 m in height, the branchlets pubescent, the branches armed with straight, sharp, often stout, spreading spines 1 to 1.5 cm long. Leaves obovate to oblong-obovate, glabrous or nearly so, 3 to 10 cm long. Flowers solitary, terminal, the calyx green, pubescent, cylindric, its lobes ovate, spreading, 5 mm long. Corolla white, soon turning yellowish, its tube about as long as the calyx, limb spreading, 1.5 to 1.8 cm in diameter. Fruit globose or ovoid, 1.5 to 2 cm long, many-seeded.

Cultivated, Singalon, fl. Feb., and probably in other months; of recent introduction here. Widely distributed in tropical Africa, Asia, and Malaya, often, perhaps, only cultivated.

2. **R. cumingiana** Vid.

A glabrous unarmed shrub or small tree 3 to 6 m high. Leaves oblong-ovate, acuminate, base acute, 6 to 11 cm long. Cymes axillary, about 3 cm long, few-flowered, the bracts and bracteoles small, acuminate. Corolla white, the tube slender, about 2 cm long. Fruit globose, fleshy, red, 8 to 10 mm in diameter.

In dry thickets, Masambong, fl. July–Sept.; widely distributed in the Philippines. Endemic.

8. HYPOBATHERUM Blume

Erect shrubs or small trees with distichous, lanceolate, glabrous or pubescent leaves which are narrowed at both ends. Flowers small, fascicled or cymose in the leaf-axils, bracteolate. Calyx-tube short, turbinate, the limb 4- or 5-lobed, persistent. Corolla-tube cylindric, the throat bearded, the lobes 4 or 5, rounded, villous inside. Stamens 4 or 5, alternate with the lobes of the corolla. Ovary 2-celled; style short; stigmas 2, villous, oblong or linear-oblong; ovules 4 to 8 in each cell. Fruit ellipsoid or subglobose, baccate, few-seeded, long-peduncled.

Species 3 or 4, India to Malaya, 1 in the Philippines.

1. **H. glomeratum** (Bartl.) K. Sch. Calagre (Tag.).

An erect dioecious shrub 2 to 3 m high, more or less pubescent or nearly glabrous, the branches long, the leaves distichous. Leaves oblong-ovate to oblong-lanceolate, acuminate, 9 to 15 cm long. Flowers fascicled, many in each axil, white, the glomerules sessile or shortly peduncled, or the perfect flowers peduncled. Calyx pubescent inside about 7 mm in diameter, the lobes 4 or 5, spreading, obtuse. Corolla about 4 mm long, campanulate, the lobes rounded. Fruit ovoid, fleshy, pubescent, about 1.5 cm long, long-peduncled. (Fl. Filip. *pl. 56, Memijia odorata.*)

In thickets, occasional, Malabon, Pandacan, etc., fl. Sept.–Jan., widely distributed in Luzon. Endemic.

9. GUETTARDA Linnaeus

Trees with opposite, usually ample leaves, the stipules intra-petiolar, deciduous. Flowers secund, polygamous, on the branches of axillary, peduncled, cymes. Calyx-tube short, the limb toothed, usually deciduous. Corolla-tube long, cylindric, the throat naked, the lobes 4 to 9, imbricate, oblong. Anthers within the tube, linear. Ovary 4- to 9-celled, cells 1-ovuled. Fruit a globose drupe, the endocarp woody, 4- to 9-celled and grooved, perforated at the top opposite the cells. (In honor of E. Guettard.)

Species about 50, all in tropical America except the following:

1. **G. speciosa** L. Bagaolan, Tabon-tabon (Tag.).

A tree 3 to 8 m high, the branchlets rather stout, often with large petiolar-scars. Leaves obovate, thin, softly pubescent on the lower surface, 12 to 25 cm long, the tip abruptly apiculate or acuminate, the base rounded or subcordate, the lateral nerves prominent, about 10 pairs. Cymes shorter than the leaves, the flowers fragrant, somewhat crowded on the short branches. Corolla white or cream-colored, silky-pubescent externally, about 8 cm long, usually 5- or 6-merous. Drupe globose or depressed-globose, 2 to 3 cm in diameter, consisting chiefly of the woody endocarp, cells 4 to 9, usually 5 or 6.

Along the seashore, Pasay, fl. most of the year; throughout the Philippines along the seashore. Tropical shores of both hemispheres.

10. COFFEA Linnaeus

Shrubs or trees, with opposite leaves and broad stipules. Flowers white, axillary, solitary, or in fascicles or cymes. Calyx-tube short, the limb often persistent. Corolla-tube long or short, the lobes 4 to 7, spreading. Anthers as many as the corolla-lobes, sessile. Ovary 2-celled; style slender; ovules 1 in each cell. Fruit fleshy, with 2 plano-convex, coriaceous or cartilaginous, 1-seeded pyrenes, the seeds concave or grooved ventrally. (Latinization of the common name, said to be derived from the name of a locality in Africa.)

Species 40, in the tropics of the Old World, 2 introduced in the Philippines.

* 1. C. **ARABICA** L. Café (Sp.); Coffee.

A small tree reaching a height of 4 or 5 m, quite glabrous. Leaves elliptic-ovate to elliptic-oblong, acuminate, base acute, shining, 8 to 15 cm long. Flowers white, in axillary fascicles, the corolla about 1.5 cm long. Fruit red, ovoid or ellipsoid, about 1.4 cm long. (Fl. Filip. *pl. 53.*)

Occasionally cultivated in our area, fl. most of the year; more or less cultivated in all parts of the Philippines. A native of south-western Asia, now cultivated in most tropical countries.

11. IXORA Linnaeus

Shrubs or small trees, glabrous or nearly so, with opposite leaves. Flowers 4-merous, white, pink, or red, few to many in terminal, trichotomously branched cymes, usually 2-bracteolate. Calyx-tube ovoid, 4-toothed. Corolla-tube slender, cylindric, elongated, the lobes spreading, twisted in bud. Stamens 4, alternate with the corolla-lobes. Ovary 2-celled; style filiform, slightly exserted; ovules 1 in each cell. Fruit globose, somewhat fleshy, with 2, 1-seeded, plano-convex, coriaceous pyrenes. (A name used by Rheede, after Baldaeus, the flowers of one species being offered to "the god Ixora" (?Isvara) in Ceylon.)

Species 125 or more, chiefly in tropical Africa and Asia, about 20 in the Philippines.

1. Calyx-lobes longer than the calyx-tubes; flowers white.. 1. *I. finlaysoniana*
1. Calyx-lobes shorter than the calyx-tubes; flowers pink or red.
    2. Flowers few in each cyme, about 1.5 cm long............ 2. *I. philippinensis*
    2. Flowers very numerous, 2 to 2.6 cm long.
        3. Leaves cordate or rounded at the base; calyx-teeth acute. 3. *I. coccinea*
        3. Leaves narrowed to the cuneate base; calyx-teeth obtuse. 4. *I. chinensis*

*1. I. **FINLAYSONIANA** Wall. Santan-puti (Tag.).

A glabrous shrub 2 to 4 m high. Leaves oblong to oblong-oblanceolate or oblong-obovate, 10 to 17 cm long, 2.5 to 6 cm wide, base narrowed, cuneate, apex blunt or blunt-acuminate. Cymes terminal, umbel-like, densely many-flowered, 10 to 15 cm in diameter. Flowers fragrant. Calyx greenish, the lobes about 5 mm long, nearly twice as long as the tube. Corolla white, the tube slender, about 3 cm long, the lobes spreading, about 6 mm long.

Cultivated for ornamental purposes, not spontaneous, fl. in all seasons. Probably a native of Siam, now cutivated in many tropical countries.

2. **I. philippinensis** Merr. Macopang-nuno (Tag.).

An erect, glabrous, branched shrub or small tree 2 to 5 m high. Leaves elliptic-oblong to oblong, subsessile, base broad, cordate, apex acute. Cymes few-flowered. Flowers pink to nearly white, 1.5 cm long, the limb about 1 cm in diameter. Fruit ovoid, somewhat fleshy, white to pink, 1 cm long or less. (Fl. Filip. *pl. 22, I. incarnata.*)

In thickets, etc., fl. Oct.–Jan.; a widely distributed, but endemic species.

*3. I. COCCINEA L. Santan-pula (Tag.).

An erect glabrous shrub 2 to 3 m high. Leaves sessile or subsessile, oblong, 5 to 9 cm long, base broadly cordate or rounded, apex obtuse or apiculate. Cymes terminal, sessile or subsessile, densely many-flowered, pubescent. Calyx-teeth short, acute. Corolla pink or red, slender, the tube about 2 cm long, the lobes oblong, about 8 mm long. (Fl. Filip. *pl. 21.*)

Cultivated, not spontaneous, fl. all the year. A native of India, introduced in the Philippines.

*4. I. CHINENSIS Lam. (*I. stricta* Roxb.). Santan (Tag.).

An erect glabrous shrub 1.5 to 3 m high. Leaves oblong-obovate to elliptic-oblong, acute or obtuse, base narrowed, cuneate, 7 to 13 cm long, the petioles short. Cymes terminal, densely many-flowered, 6 to 12 cm in diameter, glabrous. Calyx-teeth short, obtuse. Corolla pink or reddish, 2 to 2.5 cm long, the lobes rounded, 5 to 7 mm long. (Fl. Filip. *pl. 431, I. rosea.*)

Cultivated only, fl. all the year; a native of tropical Asia, now cultivated in many tropical countries.

12. PAVETTA Linnaeus

Shrubs or small trees with terete branches. Leaves opposite; stipules usually more or less united into a short sheath. Flowers numerous, 4-merous, pedicelled, in terminal, usually open, branched, corymbiform cymes or panicles. Calyx-tube ovoid, the limb 4-toothed, persistent. Corolla-tube long, slender, the lobes 4, spreading. Stamens inserted on the mouth of the corolla. Ovary 2-celled, cells 1-ovuled; style slender, long-exserted, usually about twice as long as the corolla-tube; stigma slender, entire, rarely notched. Fruit globose or ovoid, small, each with two 1-seeded pyrenes. (From the native Sinhalese name.)

Species about 100 in the tropics of the Old World, 4 or 5 in the Philippines.

1. **P. indica** L.

An erect, nearly glabrous or somewhat pubescent shrub 2 to 4 m high or more. Leaves elliptic-oblong to elliptic-lanceolate, acuminate, base usually narrowed, 6 to 15 cm long, nerves about 8 on each side of the midrib, glabrous or somewhat pubescent. Panicles short-peduncled, many-flowered, 6 to 10 cm long, pubescent. Flowers white, the corolla-tube slender, about 1.5 cm long. Fruit black when dry, subglobose, about 6 mm in diameter.

In thickets, near Maricaban, fl. May, June, rare in our area; widely distributed in the Philippines, variable. India to southern China southward to Australia.

13. MORINDA Linnaeus

Erect or climbing shrubs or small trees with terete or 4-angled branches. Leaves opposite, the stipules connate, sheathing. Flowers white, in axillary or terminal, solitary or panicled, dense heads. Calyx-tubes more or less connate, the limb short or none. Corolla short or long, the lobes 4 to 7, valvate. Ovary 2-celled, ovules 1 in each cell. Fruit large, formed of the fleshy, enlarged, connate calyces, enclosing the cartilaginous or bony, 1-seeded pyrenes. (From "morus" and "indicus," from fancied resemblance of the fruit to that of the mulberry.)

Flowers without bracteoles.. 1. *M. citrifolia*
Flowers subtended by 1 to 1.5 cm long, leaf-like bracteoles which persist in fruit.. 2. *M. bracteata*

1. **M. citrifolia** L. Bancudo, Nino, Lino (Tag.).

An erect, glabrous shrub or small tree 3 to 10 m high. Leaves broadly elliptic to oblong, obtuse, acute, or slightly acuminate, 12 to 25 cm long. Peduncles leaf-opposed, solitary, 1 to 3 cm long. Heads dense, ovoid or globose, in flower 1 to 1.5 cm in diameter, enlarged in fruit, ovoid, fleshy, white or greenish-white, and 3 to 6 cm long. Flowers not bracteolate, the calyx truncate, the corolla white, about 1 cm long, the limb 5-lobed, 1 cm in diameter. (Fl. Filip. *pl. 52.*)

In thickets, occasional, fl. all the year; widely distributed in the Philippines. India through Malaya to Australia and Polynesia.

2. **M. bracteata** Roxb. Bancudo, Lino, Nino (Tag.).

Very similar to the preceding, but often with smaller leaves, and always with leaf-like bracts 1 to 1.5 cm long subtending the flowers and persistent in fruit.

Range of the preceding.

14. PSYCHOTRIA Linnaeus

Erect shrubs or small trees, rarely climbing. Leaves opposite, the stipules intrapetiolar, often connate. Flowers small, usually numerous, in terminal cymose panicles. Calyx-tube short, the limb often deciduous. Corolla-tube short, straight, the throat naked or hairy, 5-lobed, lobes rarely 4 or 6. Stamens as many as the corolla-lobes, inserted on the throat; filaments usually short. Ovary 2-celled; cells 1-ovuled. Fruits small, globose, ovoid, or oblong, somewhat fleshy, with two, 1-seeded, plano-convex, usually longitudinally ridged or sulcate pyrenes. (From the Greek "vivifying" on account of the supposed medical qualities of some spices.)

Species more than 500 in all tropical and subtropical countries, 35 or more in the Philippines.

1. **P. luçoniensis** (Cham.) F.-Vill. (*P. tacpo* Rolfe). Tacpo or Tagpo (Tag.).

A glabrous, erect shrub 1.5 to 5 m high. Leaves smooth and shining, oblong to elliptic-oblong, petioled, 8 to 20 cm long, base acute, apex acute or slightly acuminate. Inflorescence terminal, at flowering time usually dense, 2 to 3 cm long. Flowers congested, white. Corolla 4 to 4.5 mm long, 5-lobed, the throat villous. Fruits somewhat fleshy, obovoid, yellow or reddish, 5 to 6 mm long, the seeds plano-convex. (Fl Filip *pl. 55, Paederia tacpo.*)

In thickets, occasional, fl. Oct.–March; common and widely distributed in the Philippines. Endemic.

15. PLECTRONIA Linnaeus

Spiny or unarmed, usually erect shrubs or small trees. Leaves opposite. Flowers axillary, solitary, fascicled, or umbellate, usually small. Calyx-tube short, the limb 4- or 5-toothed or lobed. Corolla-tube narrowly funnel-shaped, campanulate or globose, the throat villous, the lobes 4 or 5, reflexed. Ovary 2-celled; ovules 1 in each cell. Fruit fleshy, globose to obovoid, 2- or 1-seeded. (From the Greek "spur," in allusion to the spines of many species.)

Species about 70 in the tropics of the Old World, 10 in the Philippines.

Peduncles very short, not as long as the flower............................ 1. *P. horrida*
Peduncles long, slender, pendulous, up to 3 cm in length.. 2. *P. peduncularis*

1. **P. horrida** (Blume) Kurz.

A shrub or small tree 2 to 5 m high, the branches somewhat pubescent, armed with sharp, slender, axillary spines 5 to 10 mm in length. Leaves ovate to elliptic-ovate, short-petioled, acute, 1 to 2.5 cm long. Flowers axillary, solitary, 5-merous, greenish-yellow or nearly white, about 6 mm long, very shortly pedicelled. Fruit ovoid, red, fleshy, about 7 mm long. (Fl. Filip. *pl. 57, Canthium horridum.*)

In dry thickets, Masambong, near Fort McKinley, etc., fl. May–July; of local occurrence in the Philippines. Tenasserin to Malaya.

2. **P. peduncularis** (Cav.) Elm. Subiang-daga (Tag.).

A slender shrub 1 to 3 m high with slender, sharp, axillary spines 5 to 13 mm long, the branchlets, leaves and pedicels slightly pubescent. Leaves ovate to ovate-lanceolate, 2 to 4 cm long, 1 to 1.8 cm wide, base acute, apex acuminate or acute; petiole short, about 2.5 mm long. Flowers solitary, axillary, pendulous, white, their pedicels slender, 2 to 3 cm long, minutely bracteolate near the apex. Calyx small, with 5 acuminate teeth. Corolla white, the tube cylindric, 4 mm long, the lobes lanceolate, acuminate, reflexed, 1.2 to 1.5 cm long. Fruit obovoid or subglobose, slightly compressed, glabrous, greenish-yellow, about 1 cm thick, 8 mm long, fleshy, containing 2 seeds.

In thickets, Masambong, Pasay, etc., fl. July–Dec.; widely distributed in the Philippines. Endemic.

16. PAEDERIA Linnaeus

Slender, twining, herbaceous vines, with a foetid odor when crushed. Leaves opposite, the stipules deciduous. Flowers in axillary and terminal di- or tri-chotomously branched paniculate cymes. Calyx-limb persistent, 4- or 5-toothed. Corolla, tubular, pubescent, 4- or 5-lobed, the margins inflexed, crisped. Anthers 4 or 5, in the corolla-tube. Ovary 2-celled; stigmas 2, slender, twisted; ovules 1 in each cell. Fruit globose, the epicarp thin, fragile, surrounding the 2, orbicular or oblong, thin or coriaceous pyrenes. Seeds 1 in each pyrenes, dorsally compressed. (Greek name of a pink-flowered plant.)

Species 9 or 10 in tropical Asia and Malaya and 1 in Brazil, 2 in the Philippines.

4. **P. tomentosa** Blume. Cantutay (Tag.).

A scandent, herbaceous, more or less pubescent or quite glabrous, slender vine, when crushed with a distinct odor of carbon bisulphide. Leaves ovate to oblong-ovate, sharply acuminate, base rounded or slightly cordate, 6 to 10 cm long, 3.5 to 5.5 cm wide. Inflorescence of axillary, lax, peduncled, few-flowered cymes, forming a leafy panicle. Flowers sessile. Calyx small, 5-toothed. Corolla 1 to 1.3 cm long, somewhat cylindric, pale-purple to nearly white outside, rather deep-purple and villous within, the limb somewhat spreading, with 5 undulate lobes. Fruit subglobose, about 5 mm in diameter. (Fl. Filip. *pl. 54, P. foetida.*)

Rather common in thickets, etc., fl. July–Oct.; throughout the Philippines. India to China, Japan, and Malaya.

17. SPERMACOCE Linnaeus

Spreading or erect, branched herbs, the branches usually 4-angled. Leaves opposite, the stipules connate with the petioles into a broad bristly tube. Flowers small, axillary, solitary or fascicled. Calyx-tube with 2 to 4, rarely 5 teeth, often with interposed teeth or bristles. Corolla tubular, funnel- or salver-shaped, the lobes 4, valvate. Stamens 4, inserted on the throat or tube of the corolla. Ovary 2-celled; style filiform; ovules 1 in each cell. Fruit of 2 crustaceous or coriaceous mericarps which dehisce variously. (Greek "seed" and "point," in allusion to the fruits crowned by the calyx-teeth.)

Species about 150 in most tropical and subtropical countries, 3 in the Philippines.

Stems and leaves hispid; corolla about 5 mm long........................ 1. *S. hispida*
Stems and leaves glabrous; corolla less than 2 mm long........ 2. *S. ocymoides*

1. **S. hispida** L.

A procumbent, branched, scabrid or hispid herb, the branches rather stout, often ascending, 4-angled, greenish or purplish, 10 to 40 cm long. Leaves obovate, oblong, or elliptic, acute or obtuse, shortly petioled, 1 to 3 cm long, rather thick, scabrid; stipules bristly. Flowers axillary, fascicled, 1 to 6 in each axil. Calyx green, slightly hispid, the lobes narrowly oblong, 1.5 to 2 mm long. Corolla pale-blue or nearly white, about 5 mm long. Capsules oblong-ovoid, hispid or hirsute, about 5 mm long.

In open dry grass lands and waste places, especially near the sea, fl. July–Feb.; widely distributed in the Philippines. India to China and Malaya.

2. **S. ocymoides** Burm.

A slender decumbent or ascending herb, branched from the base, 20 to 40 cm high, glabrous or nearly so, the stems 4-angled. Leaves thin, not scabrid, elliptic to oblong, acute, 1.5 to 2.5 cm long, the stipules pectinate. Flowers numerous, small, axillary, crowded. Calyx green, 1.5 mm long. Corolla white, about 1.2 mm long, cleft nearly to the base. Capsules about 2 mm long, somewhat hairy.

In dry thickets, Guadalupe, near Fort McKinley, etc., fl. Sept.–Jan. Of local occurrence in the Philippines. Tropical Asia, Africa, and Malaya.

132. CUCURBITACEAE (GOURD OR CALABAZA FAMILY.)

Annual or perennial tendril-bearing vines with alternate, simple, lobed or divided, usually cordate leaves. Flowers regular, moneocious or dioecious, solitary, racemed, umbellate, or panicled. Calyx-tube adnate to the ovary, the limb tubular or campanulate, 5-lobed. Petals 5, more or less united or sometimes free, the lobes entire or fimbriated. Stamens usually 3, sometimes 5 or 2; anthers free or united, the cells straight or conduplicate. Ovary inferior, 3-celled; styles 1 to 4, usually 1 with 3 stigmas; ovules many, on parietal placentae. Fruit small to very large, fleshy or ultimately dry, indehiscent or dehiscing by valves or by an operculum. Seeds numerous, usually imbedded in pulp or fiber, often compressed, frequently wrinkled.

Genera 96, species 750, in the warmer parts of the entire world especially in the tropics, 14 genera and about 30 species in the Philippines.

1. Anther-cells straight; slender vines with small flowers and fruit. 1. *Melothria*
1. Anther cells conduplicate or curved in two directions like the letter S.
  2. Corolla divided about one-half to the base or less; coarse vines with large, solitary, yellow flowers and very large fruits...... 2. *Cucurbita*
  2. Petals free, or corolla divided nearly to the base.
    3. Petals fimbriate.. 3. *Trichosanthes*
    3. Petals entire.
      4. Flowers white; calyx-tube of the male flowers elongated; anthers included or nearly so.. 4. *Lagenaria*
      4. Flowers mostly yellow; calyx-tube of the male flowers short; anthers usually exserted.
        5. Anthers not or scarcely cohering; stamens inserted near the mouth of the calyx-tube.
          6. Male flowers racemose; fruit cylindric, sometimes angled, opening at the end... 5. *Luffa*
          6. Flowers solitary; fruit ellipsoid, indehiscent........ 6. *Benincasa*
        5. Anthers more or less cohering; stamens inserted below the mouth of the calyx-tube.
          6. Tendrils 2- or 3-fid; leaves deeply lobed, the lobes pinnatifid. 7. *Citrullus*
          6. Tendrils simple, lobes of the leaves not pinnatifid.
            7. Male flowers clustered, short-pedicelled................ 8. *Cucumis*
            7. Male flowers racemose, or solitary and long pedicelled, usually bracteolate.. 9. *Momordica*

1. MELOTHRIA Linnaeus

Climbing, usually slender herbs, the tendrils simple or 2-fid. Leaves deltoid-ovate, base truncate or cordate, entire or lobed, usually scabrous. Flowers small, monoecious, pedicellate, axillary. Calyx-tube short, teeth 5. Corolla 5-partite. Male flowers with 3 stamens inserted on the middle of the calyx-tube. Female flowers with an oblong ovary; stigmas 3. Fruit globose to ellipsoid or fusiform. Seeds small, numerous. (Altered from the Greek name of a kind of wild grape.)

Species about 55 of wide tropical distribution, 4 or 5 in the Philippines.

1. M. INDICA Lour. Melon-daga (Tag.).

A slender vine 1 to 2 m long with simple tendrils. Leaves scabrous, triangular-ovate, acute or acuminate, base hastate-cordate, margins subentire or irregularly toothed, or even slightly lobed, 3 to 8 cm long. Flowers somewhat straw-colored, about 5 mm long, then pedicels slender, 1 to 2.5

cm long, solitary or few in each axil, males and females often in the same axil. Fruits ovoid or ellipsoid, pointed; about 2 cm long. (Fl. Filip. *pl. 365.*)

In open grass lands, occasional, fl. Sept.–Feb.; widely distributed in the Philippines, probably introduced. India to Japan southward to Malaya.

2. CUCURBITA Linnaeus

Coarse, herbaceous, hispid or hairy annual vines. Leaves cordate, 5-angled or lobed. Flowers large, yellow, monoeceous, all solitary. Calyx-tube campanulate, the lobes 5, linear or foliaceous. Corolla campanulate, 5-lobed. Male flowers with 3 stamens inserted in the calyx-tube; anthers connate, one 1-celled, two 2-celled. Female flowers with an oblong ovary; style short; stigmas 3, bifid. Fruit very large, indehiscent, fleshy. Seeds compressed, margined, smooth. (The Latin name for the gourd.)

Species 10, in the warmer parts of America, several now cultivated in all warm countries.

1. C. MAXIMA Duchesne. Calabaza (Sp.); Squash.

A very coarse, prostrate or climbing, annual, herbaceous vine, reaching a length of 4 m or more. Leaves orbicular-cordate, hispid, 15 to 30 cm in diameter, shallowly 5-lobed, rather finely toothed, the upper surface often mottled. Flowers campanulate, erect, yellow, about 12 cm long, the corolla limb about as wide, 5-lobed, the male flowers with longer peduncles than the female ones. Fruit very large, variable in shape. (Fl. Filip. *pl. 320.*)

Commonly cultivated for its edible fruit, fl. all the year; throughout the Philippines. Cultivated in all warm and tropical countries, probably a native of tropical America.

3. TRICHOSANTHES Linnaeus

Slender or coarse herbaceous vines with 3- to 9-lobed denticulate leaves. Flowers white, the male peduncles usually in axillary pairs, one 1-flowered, the other racemose, the bracts large, small, or none. Calyx long-tubular, teeth 5, entire, serrate, or laciniate. Corolla deeply 5-fid, the lobes long-fimbriate; stamens 3, anthers connate, the cells conduplicate. Female flowers solitary. Calyx and corolla as in the male. Ovary 1-celled; style slender, 3- or 6-fid at the apex. Fruit globose or ovoid, smooth. Seeds few to many, compressed. (Greek "hair" and "flower," from the fimbriate petals.)

Species about 40, India to Japan southward to Australia, 3 or 4 in the Philippines.

Male inflorescence without bracts; slender vines with small flowers and small fruits........ 1. *T. cucumerina*
Male inflorescence with large bracts; coarse vines with large flowers and large, globose, red fruits........ 2. *T. quinquangulata*

1. **T. cucumerina** L. Melon-melonang, Melon-daga (Tag.).

Scandent, herbaceous, 5 to 6 m high or less, the stems green, 4-angled, somewhat hairy. Leaves somewhat orbicular in outline, 7 to 14 cm long and broad, 3- or 5-lobed, the lobes broad, rounded or obtuse, the sinuses broad or narrow, rounded, the base broadly cordate, somewhat pubescent on both surfaces. Staminate inflorescence long-peduncled, axillary, cymosely 6- to 15-flowered, bracts minute or none. Calyx-tube dilated above, about 1 cm long, green, hairy. Petals white, nearly free, fimbriate, oblong, about 1.3 cm long. Pistillate flowers soliary, axillary, peduncled. Fruits ellipsoid, pointed, up to 4 cm long, 2.5 cm thick, green, mottled with longitudinal gray stripes when young, orange-red when mature. Seeds somewhat compressed, undulate, hard, rugose, nearly 1 cm long, imbedded in a soft, red pulp. (Fl. Filip. *pl. 460, T. lucioniana.*)

In thickets, scattered, fl. June–Dec.; widely distributed in the Philippines. India, through Malaya to Australia.

2. **T. quinquangulata** A. Gray. Tabuyoc (Tag.).

A coarse glabrous vine with angled or sulcate stems. Leaves suborbicular, 10 to 20 cm long, acuminate, base deeply cordate, sharply 5- or 7-angled or lobed. Male racemes long-peduncled, many-flowered, one or two flowers opening at a time, the bracts large, ovate, 3 to 4 cm long. Flowers white, large. Calyx-lobes 2 to 2.5 cm long, irregularly toothed. Corolla-tube slender, the limb spreading, 7 to 9 cm in diameter. Fruit globose, smooth, red or crimson, 10 cm in diameter.

Cementerio del Norte, fl. Nov.–Feb.; widely distributed in the Philippines. Endemic.

4. LAGENARIA Seringe

A coarse, annual, herbaceous vine. Leaves ovate to orbicular, cordate, toothed, the petiole 2-glandular at the apex. Flowers large, white, solitary, the males long-, the females short-peduncled. Calyx-tube funnel-shaped, with 5 narrow teeth. Petals 5, free, obovate. Male flowers with 3 stamens, the anthers connate, their cells conduplicate. Female-flowers: Ovary oblong; style short, with 3 bifid lobes. Fruit large, fleshy, ultimately dry, indehiscent, very variable in shape. (Greek "flask" from the shape of the fruit.)

A monotypic genus. Standl.
L. siceraria

*1. L. LEUCANTHA (Lam.) Rusby (*L. vulgaris* Seringe). Opo, Upo (Tag.).

A rather coarse vine reaching a length of several meters. Leaves suborbicular, pubescent on both surfaces, more or less 5-angled or lobed, 10 to 40 cm in diameter. Flowers white, the petals 3 to 4 cm long. Calyx pubescent. Fruit green, mottled with gray or white, polymorphous, in the commonest form club-shaped, up to 80 cm long and 15 cm in diameter, but in other forms, ovoid to depressed-globose and nearly as thick as long.

Commonly cultivated for its edible fruit, fl. Jan.–June; throughout the Philippines in cultivation, not spontaneous. A native of tropical Asia or Africa, now cultivated in all tropical countries; of prehistoric introduction in the Philippines.

5. LUFFA Adanson

Usually rather coarse, pubescent or nearly glabrous vines. Leaves cordate, 5-angled or -lobed. Flowers yellow, monoecious, the males in long or short racemes, the females solitary. Male flowers: Calyx-tube obconical, the lobes 5, triangular to lanceolate. Petals 5, obovate. Stamens 2 or 3, or 5, the filaments free or connate. Female flowers: Calyx-tube slightly produced above the ovary, the lobes and corolla as in the males. Ovary oblong; style cylindric; stigma 3-lobed. Fruit large or small, cylindric or 10-angled, oblong, 3-celled, fleshy when immature, ultimately dry, usually dehiscing by a circumsciss operculum at the top. (From the Arabic or Egyptian name of one species.)

Species 6 in the warmer parts of the Old World, 2 introduced in the Philippines.

Stamens 5; fruit cylindric.. 1. *L. cylindrica*
Stamens 2 or 3; fruit sharply 10-angled.................................. 2. *L. acutangula*

1. L. CYLINDRICA Roem. (*L. aegyptiaca* Mill.). Patola, Taboboc (wild form) (Tag.).

A scandent, somewhat hairy or nearly glabrous, herbaceous, annual vine reaching a length of 10 m or more, the stems 5-angled. Leaves 10 to 20 cm in diameter, orbicular-ovate to reniform-ovate, acuminate, shallowly 5- or 7-angled or lobed, denticulate, scabrous, base deeply cordate. Male flowers in axillary, solitary, long-peduncled racemes, crowded at and near the apex of the peduncle. Calyx green, the lobes ovate-lanceolate, acuminate, about 1 cm long. Corolla rotate, yellow, 5 to 7 cm in diameter. Stamens 5. Female flowers solitary, peduncled. Fruit oblong, cylindric, green, 12 to 30 cm long, smooth or slightly 10-ribbed. (Fl. Filip. *pl. 334, L. petola.*)

Commonly cultivated for its edible fruit, fl. all the year; common throughout the Philippines, cultivated and wild. Tropics of the world, native country uncertain.

*2. L. ACUTANGULA Roxb. Patola (Tag.).

A coarse, annual, herbaceous vine. Leaves suborbicular-ovate, 10 to 20 cm long, shallowly 5-lobed, base cordate. Female flowers axillary, pedicelled, solitary. Staminate flowers in axillary racemes, yellow, 2 cm long, the calyx-lobes lanceolate, acuminate. Stamens 2 or 3. Fruit oblong-oblanceolate, 20 to 25 cm long, about 5 cm in diameter, green, with 10, prominent, longitudinal, sharp angles. (Fl. Filip. *pl. 288.*)

Cultivated for its edible fruit, occasionally subspontaneous, fl. July–Nov.; generally cultivated in the Philippines. India and Malaya.

6. BENINCASA Savi

A coarse, hairy, climbing vine. Leaves cordate, reniform-orbicular, more or less 5- or 7-lobed. Flowers large, yellow, monoecious, solitary. Calyx-tube campanulate, the lobes 5, serrate, leaf-like. Petals 5, nearly free, obovate. Male flowers with 5 stamens, the anthers free, one 1-celled, two 2-celled. Female flowers with an oblong, densely hairy ovary; style thick; stigmas 3, flexuose. Fruit large, fleshy, indehiscent, oblong or ellipsoid; somewhat hairy, covered with a glaucous waxy bloom. (In honor of Count Benincasa.)

A monotypic genus.

*1. B. HISPIDA (Thumb.) Cogn. (*B. cerifera* Savi). Condol (Tag.).

A rather coarse, spreading, hairy, annual vine reaching a length of several meters, the younger parts rather densely villous. Leaves rounded or reniform, deeply cordate, 5- or 7-lobed, 10 to 25 cm in diameter. Peduncles hirsute, the males 5 to 15 cm long, the females much shorter. Calyx-tube densely villous. Petals spreading, 3 to 5 cm long. Fruit ellipsoid or oval, rarely subglobose, 25 to 40 cm long, with few to many fragile hairs, densely covered with a glaucous waxy bloom. (Fl. Filip. *pl. 323.*)

Occasionally cultivated in our area, fl. Jan.–May, and probably in other months. India to Japan, southward to Australia and Polynesia, probably a native of tropical Asia; of prehistoric introduction in the Philippines.

7. CITRULLUS Schrader

Annual, hispid or scabrous vines. Leaves palmately 3- to 7-lobed, the segments narrowly sinuate-pinnatifid. Flowers monoecious, yellow, solitary. Calyx-tube campanulate, 5-lobed. Corolla broadly campanulate or rotate, deeply 5-parted. Male flowers with 3 stamens, the anthers nearly free, one 1-celled, two 2-celled. Female flowers with an ovoid ovary; style short; stigmas 3, reniform. Fruit large, ellipsoid, smooth, fleshy, indehiscent. Seeds oblong, compressed, smooth, black. (From the Latin name of the citron-tree from fancied resemblance of the fruits.)

Species 2, widely cultivated, 1 introduced and cultivated in the Philippines.

* 1. C. VULGARIS (L.) Schrad. Sandia (Sp.); Watermelon.

A spreading, hairy, tendril-bearing, annual vine, reaching a length of several meters. Leaves petioled, in outline oblong-ovate, 8 to 20 cm long, deeply 3- to 7-lobed, the lobes pinnatifid, the segments usually narrow. Flowers monoecious, axillary, solitary, yellow, about 2 cm in diameter. Fruit very large, edible, smooth, green mottled with gray, ellipsoid to oblong, in local varieties up to 30 cm in length.

Frequently cultivated in the Philippines, occasional in our area, fl. Dec.–March, and probably in other months. Cultivated in all warm countries, a native of tropical Africa.

8. CUCUMIS Linnaeus

Climbing, hispid or scabrous, monoecious, annual vines. Leaves palmately 3- to 7-lobed or angled. Flowers yellow, shortly peduncled, the males clustered, the females solitary. Calyx-tube obconic or campanulate, 5-lobed. Corolla campanulate, deeply 5-lobed. Male flowers with 3 stamens, the anther-cells conduplicate or flexuose, connective produced in a crest. Female flowers with an ovoid to oblong ovary; style short; stigmas 3, obtuse. Fruit fleshy, indehiscent, cylindric, smooth or tuberculate. (Latin name of the cucumber.)

Species about 26, mostly in tropical Africa, others in tropical Asia, Australia, and America, a few of uncertain origin, 2 introduced in the Philippines.

Fruit glabrous.. 1. *C. melo*
Fruit more or less tuberculate........................ 2. *C. sativus*

* 1. C. MELO L. Melón (Sp.); Melon.

A spreading, annual, more or less hispid or villous vine. Leaves suborbicular, 6 to 15 cm long, deeply cordate, angular, shallowly 3- to 7-lobed, or only repand and denticulate. Flowers yellow, 1.5 to 2 cm long. Calyx-tube densely villous. Fruit usually ellipsoid, smooth, green, longitudinally stripped or mottled, 20 cm long or less.

Cutivated, fl. March–May. A native of tropical Asia or Africa, now cultivated in all warm countries.

* 2. C. SATIVUS L. Pepino (Sp.); Cucumber.

An annual, rather coarse, prostrate or climbing vine. Leaves ovate, 8 to 14 cm long, 5-angled or 5-lobed, the lobes or angles acute, hispidulous on both surfaces. Flowers axillary, solitary or fascicled, sessile or short-pedicelled, the male and female similar in color and size, yellow, about 2 cm long. Fruit various, usually cylindric, 10 to 20 cm long, yellow when mature, slightly tuberculate. (Fl. Filip. *pl. 299.*)

Generally cultivated for its edible fruits, fl. all the year. Cultivated in all warm and tropical countries, probably a native of tropical Asia.

9. MOMORDICA Linnaeus

Slender, coarse, annual or perennial vines. Leaves cordate, undivided or lobed. Flowers monoecious or dioecious, yellow or white, the females solitary, peduncled, the males solitary or racemose, bracteolate or not. Male flowers: Calyx-tube short, campanulate, 5-lobed. Corolla 5-partite nearly to the base. Stamens 3, the anthers free, one 1-celled, the other two 2-celled. Female flowers similar to the males. Ovary oblong; style long; stigmas 3. Fruit globose, or oblong to lanceolate-cylindric, rugose, indehiscent or dehiscent. Seeds smooth, wrinkled, or sculptured. (Latin "bite," from the bitten appearance of the seeds.)

Species about 25, mostly in tropical Asia and Africa, few in America, 3 or 4 in the Philippines.

A monoecious slender vine with small flowers, 12 mm long or less, and oblong edible fruits.. 1. *M. charantia*

A dioecious coarse vine with large flowers 3 to 4 cm long subtended by a large bracteole, the fruits large, globose................ 2. *M. cochinchinensis*

1. **M. CHARANTIA** L. Amargoso (Sp.-Fil.); Ampalaya (Tag.); Parria (Il.).

A scandent, herbaceous, nearly or quite glabrous, annual, herbaceous vine, the simple tendrils up to 20 cm in length. Leaves orbicular, 2.5 to 10 cm in diameter, cut nearly to the base into 5 or 7, oblong-ovate, variously toothed and lobed lobes, base cordate. Flowers axillary, long-peduncled, yellow, the staminate flower about 12 mm long, peduncled, with an orbicular, green, about 1 cm long bract at about the middle, the pistillate flowers similar to the staminate ones, long-peduncled. Fruit oblong, cylindric, from 2 to 3 cm in wild forms, to at least 25 cm in length in cultivated forms, pointed at both ends, ribbed, rugose. (Fl. Filip. *pl. 357.*)

In thickets and waste places, fl. all the year, also extensively cultivated for its edible fruits which are sold in the Manila markets in all seasons; throughout the Philippines, cultivated and wild. Tropics of the world, probably of Asiatic origin.

2. **M. cochinchinensis** (Lour.) Spreng. Boyoc-boyoc (Tag.); Barbas baquero (Sp.-Fil.).

A coarse dioecious vine reaching a length of 15 m, slightly pubescent or nearly glabrous, the petioles, bracteoles, and sometimes the basal leaf-margins supplied with few large glands. Leaves broadly ovate, 8 to 18 cm long, acuminate, deeply palmately 3-lobed or sometimes entire. Male flowers axillary, solitary, pedicelled, the buds enclosed by a large, green, inflated bracteole which in inhabited by ants, opening at anthesis, turning yellowish. Calyx nearly black, with 5 acuminate lobes, about 2 cm in diameter. Petals pale-yellow, oblong or oblong-ovate, 3.5 to 4 cm long, three with a large dark-colored blotch at the base. Fruits large, ovoid or subglobose, 8 to 12 cm in diameter, yellow, roughened with scattered, tubercle-like spines. Seeds large, flattened, circular.

In thickets, Pasay, near Fort McKinley, etc., fl. March–June; widely distributed in the Philippines. India to southern China and Malaya.

133. CAMPANULACEAE (BLUEBELL FAMILY)

Herbaceous plants, sometimes climbing, often with milky juice. Leaves alternate or opposite, entire or toothed. Flowers axillary or terminal, solitary, spicate, or racemose. Calyx-limb 4- to 6-parted, usually persistent. Corolla regular or irregular, tubular, campanulate, or rotate. Stamens 4 to 6, alternating with the lobes, inserted on the corolla-tube or on the margin of an epigynous disk; anthers free or united in a tube. Ovary inferior, 2- to 5-celled, many-ovuled. Fruit capsular, dry or berry-like. Seeds small, numerous.

Genera 13, species over 200, in all parts of the world, 8 genera and 10 species, in the Philippines.

Flowers very small, in dense, terminal, cylindric spikes.......... 1. *Sphenoclea*
Flowers large, axillary, solitary, the corolla-tube up to 10 cm in length; cultivated only.......... 2. *Isotoma*

1. SPHENOCLEA Gaertner

An annual, erect, branched, glabrous herb. Leaves alternate, entire, lanceolate. Flowers in dense, lateral and terminal, ovoid- to oblong-cylindric spikes. Flowers small, bracteate and 2-bracteolate. Calyx limb 5-fid Corolla epigynous, 5-lobed. Stamens 5, alternate with the corolla-segments. Ovary 2-celled, at first inferior. Capsule one-half inferior, membranaceous below, the upper part free, depressed, hard, circumsciss. Seeds small, numerous. (Diminutive of Greek "wedge.")

A monotypic genus.

1. S. zeylanica Gaertn.

An erect branched herb 20 to 60 cm high. Leaves lanceolate, shortly petioled, 4 to 9 cm long, narrowed at both ends, blunt or acute. Spikes green, dense, 1 to 4 cm long, 6 to 8 mm in diameter, ovoid- to oblong-cylindric, apex acute. Calyx green, lobes somewhat enlarged in fruit. Corolla white, globose-ovoid, about 2.5 mm long and wide. Capsule about 4 mm in diameter, the calyx-lobes inflexed over the apex. (Fl. Filip. *pl. 148.*)

In open places about mud-holes, in swamps, etc., fl. Dec.–March; widely distributed in the Philippines. Tropics generally.

2. ISOTOMA Lindley

Erect herbs with alternate, elongated, coarsely toothed or lobed leaves. Flowers axillary, elongated. Calyx-tube adnate to the ovary, the limb 5-partite, the lobes linear to lanceolate. Corolla-tube cylindric, long, the lobes 5, spreading. Stamens attached above the middle of the tube, the filaments more or less connate, 2 of the anthers crowned with a broad rigid or slender bristle, the 3 larger ones naked. Ovary inferior, 2-celled; stigma shortly 2-lobed. Capsule ovoid, often oblique, loculicidally 2-valved at the apex. Seeds many, small. (Greek "equal" and "a cutting," in allusion to the equal corolla-lobes.)

Species about 8, mostly in Australia, few in tropical America, 1 introduced in the Philippines.

*1. I. LONGIFLORA (Mill.) Presl. Estrella (Sp.-Fil.).

An erect, spreading, branched or simple, nearly glabrous or somewhat hairy herb 20 to 50 cm high, the stems rather stout. Leaves 10 to 20 cm long, alternate, sessile or subsessile, oblanceolate, acute or acuminate, narrowed at both ends, coarsely and irregularly toothed especially below. Flowers fragrant, axillary, solitary, erect, short-pedicelled. Calyx green, 5-angled, ovoid, the tube about 1 cm long, the 5 lobes linear, denticulate, about 1.5 cm long. Corolla white, the tube slender, 8 to 10 cm long, the lobes spreading, lanceolate, 2.5 cm long. Capsule nodding, about 2 cm long, slightly protruding from the calyx-tube.

Not uncommon in cultivation, but not spontaneous, fl. most of the year. A native of the West Indies and of recent introduction here.

134. GOODENIACEAE (SCAEVOLA FAMILY)

Herbs, sometimes scandent, or shrubs. Leaves alternate, entire or toothed. Flowers perfect, axillary, or in terminal spikes, racemes, or panicles. Calyx-tube adnate to the ovary, the limb 5-lobed. Corolla irregular, 5-lobed, split down one side, the margins of the lobes induplicate. Stamens 5, alternate with the corolla-lobes, inserted at or near the juncture of the corolla-tube with the ovary. Ovary inferior, 1- or 2-celled, ovules 1 or more in each cell; style simple, undivided, with a cup-shaped dilatation enclosing or surrounding the stigma, or 3-lobed, the lobes ciliate. Fruit capsular and dehiscent or drupaceous and indehiscent.

Genera 12, species about 200, almost entirely confined to Australia, 2 genera and about 8 species in the Philippines, the following the only representative in our area.

1. CALOGYNE R. Brown

Slender, erect or spreading, more or less hairy, annual herbs. Leaves alternate. Flowers axillary, pedicelled, solitary. Calyx-tube short, adnate to the ovary, 5-lobed, the lobes longer than the tube. Corolla split down one side to the base, the upper 2 lobes separating near the base, unequally winged, the lower three as long as the upper ones, united for one-half to two-thirds their length, winged. Stamens free, short. Ovary inferior, 1- or 2-celled, ovules few in each cell. Style deeply divided into 3 branches, the middle one shorter than the 2 lateral ones, the tips of the arms ciliate. (Greek "beautiful" and "woman," in allusion to the forked and ciliate style.)

Species four, 3 in Australia, and 1 in Australia, Luzon, and southern China.

1. C. pilosa R. Br. (*Balingayum decumbens* Blanco).

A spreading, diffuse, or sometimes ascending, slender, hairy, annual plant, the stems 20 cm long or less, simple or slightly branched. Leaves lanceolate to linear-lanceolate, sinuate- or repand-toothed, or nearly entire, the upper ones more or less reduced. Peduncles 1.5 cm long or less. Calyx green, the tube short, the lobes lanceolate, 3 to 4 mm long. Corolla purplish, about 8 mm long. Capsule hairy, ovoid, about 5 mm long.

In open damp grass lands, old rice paddies, etc., Caloocan to San Pedro Macati, abundant, fl. Aug.–Jan. Known in the Philippines only from the country contiguous to Manila. North Australia, Queensland, and southern China.

135. STYLIDIACEAE (STYLIDIUM FAMILY)

Annual or perennial, usually slender herbs, rarely undershrubs. Leaves alternate, entire. Flowers axillary, racemose, or cymose, small, perfect. Calyx adnate to the ovary, mostly 5-lobed or 2-lipped. Corolla gamopetalous, usually irregular, rarely regular. Stamens 2, rarely 3, the filaments connate with the style into a column. Ovary inferior, 2-celled; stigma at the apex of the column; ovules many. Fruit a 1- or 2-celled, 2-valved capsule, the valves cohering at the base and apex, or only at the base.

Genera 6, species about 130, mostly in Australia, few in Antartic America, still fewer in India and Malaya, 1 in the Philippines.

STYLIDIUM Swartz

Small, slender, glabrous, annual herbs. Flowers axillary, sessile. Calyx 5-lobed, the lobes usually more or less united in two lips. Corolla irregular, 5-lobed, 4 lobes suberect in 2 pairs, and one smaller, recurved. Staminal column elongated, apex at first deflexed, elastically reflexed when irritated. Capsules small, elongated. (From the Greek "column," in allusion to the connate style and stamens.)

Species 103, nearly all Australian, 1 extending to the Philippines, 3 in India and China.

1. S. alsinoides R. Br.

Slender, glabrous, erect or spreading, simple or irregularly branched, 6 to 15 cm high. Leaves sessile, ovate, opposite, or the lower ones alternate, acute or acuminate, 3 to 6 mm long. Flowers solitary, alternating, 1 at each node in the axil of an often reduced leaf. Calyx-tube long, slender. Corolla-lobes slightly exceeding the calyx-lobes, apparently pink. Capsule slender, 1 to 1.5 cm long.

In open, wet, grasslands, rice paddies, etc., San Lazaro, fl. in the rainy reason; of local occurrence in the Philippines. Northern Australia and Queensland.

136. COMPOSITAE [1] (COMPOSITE OR SAMBONG FAMILY)

Erect or spreading herbs, herbaceous or woody vines, shrubs, or very rarely trees. Leaves alternate, rarely opposite or whorled, simple, entire, toothed, or variously lobed, or compound. Flowers few to very numerous in close heads which are solitary, or in racemes or panicles, each head with an involucre of bracts surrounding the flowers, the receptacle pitted or nearly smooth, naked or paleate. Calyx-tube united with the 1-celled ovary, the the limb none, or of hairs (pappus), scales, or bristles, crowning the summit and usually persistent in fruit. Corolla strap-shaped or tubular, 3- to 5-toothed or lobed. Stamens 4 or 5, inserted on the corolla-tube, their anthers united. Ovary 1-celled, 1-ovuled; style 2-cleft or entire. Fruit a dry, indehiscent achene, usually crowned by hairs, bristles, or scales.

The largest family of flowering plants, comprising about 900 genera, and over 14,000 species, in all parts of the world, but chiefly in temperate regions, 51 genera and about 110 species in the Philippines.

The flowers may be perfect or polygamous, monoecious, or dioecious. Flowers with a strap-shaped (ligulate) corolla are called ray-flowers, and these may be confined to the outer one or several rows, or all the flowers may be ligulate; a head containing in part or all ray-flowers is called radiate. The tubular or campanulate flowers compose the disk, and a head that contains no ray-flowers is called discoid. When a head contains two kinds of flowers it is called heterogamous and when only one kind, homogamous.

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[1] For a consideration of the Philippine species of this family see Elmer, A. D. E., "Manual of the Philippine Compositae." *Leafl. Philip. Bot.* 1 (1906) 83–186.

1. Flowers all tubular or campanulate, no ray-flowers present.
   2. Flowers homogamous, that is, all perfect and alike.
      3. Heads few to many, many-flowered, not crowded in dense involucrate masses or spicately arranged.
         4. Involucral-bracts in several series.
            5. Pappus of long hairs.
               6. Style-arms, slender, hairy .... 1. *Vernonia*
               6. Style-arms glabrous or nearly so .... 2. *Eupatorium*
            5. Pappus of 5 awned scales .... 3. *Ageratum*
         4. Involucral bracts in a single series .... 4. *Emilia*
      3. Heads few-flowered, fascicled, forming dense, often subcapitate and involucrate clusters, or in pairs and spicately arranged. 5. *Elephantopus*
   2. Flowers heterogamous, the outer ones female, the inner ones perfect.
      3. Heads arranged in dense, globose, peduncled masses; branches winged .... 6. *Sphaeranthus*
      3. Heads not arranged in globose masses, corymbose, panicled, or racemose.
         4. Pappus of numerous soft hairs.
            5. Herbs, often coarse and shrub-like; involucral scales narrow; flowers usually yellow .... 7. *Blumea*
            5. Low shrubs with slender stems and pale-purple flowers; involucral bracts broad .... 8. *Pluchea*
         4. Pappus none, cup-like, or of scales or spines, not hairy.
            5. Pappus represented by a bristly or toothed, cup-like ring. 9. *Grangea*
            5. Pappus of small lacerate or divided scales .... 10. *Crossostephium*
            5. Pappus of spines terminating the angles, 2 to 3 times as long as the achenes .... 11. *Synedrella*
            5. Pappus none.
               6. Rather coarse aromatic herbs with numerous heads. 12. *Artemisia*
               6. Slender, prostrate or spreading, very small herbs with solitary heads.
                  7. Heads short-peduncled; anther-cells tailed .... 13. *Epaltes*
                  7. Heads sessile; anther-cells not tailed .... 14. *Centipeda*
1. Ray-flowers present, 1 or more outer rows ligulate, the disk-flowers tubular.
   2. Pappus of few to many hairs .... 15. *Erigeron*
   2. Pappus of awns or scales, or none.
      3. Pappus cupular, scale-like, or none.
         4. Involucral-bracts united; rank scented cultivated herbs with large yellow flowers .... 16. *Tagetes*
         4. Involucral-bracts free or nearly so.
            5. Receptacle smooth or pitted, not paleaceous.. 17. *Chrysanthemum*
            5. Receptacle paleaceous.
               6. Outer 4 bracts large, foliaceous, in opposite pairs. 18. *Enhydra*
               6. Bracts all similar, or at least the outer 4 not foliaceous.

7. Paleae of the receptacle flat, narrow.................... 19. *Eclipta*
7. Paleae of the receptacle embracing the achenes.
8. Pappus of 2 to 4 thin, chaffy, deciduous scales; coarse erect, cultivated plants with very large heads. 20. *Helianthus*
8. Pappus none.................... 21. *Wedelia*
3. Pappus of 2 or 4 awns.
4. Achenes long-beaked.................... 22. *Cosmos*
4. Achenes not beaked.................... 23. *Bidens*
1. All the flowers ligulate, no tubular ones present; herbs with milky juice.
2. Leaves scattered along the stem, not rosulate.
3. Achenes beaked.................... 24. *Lactuca*
3. Achenes not beaked.................... 25. *Sonchus*
2. Leaves all or mostly basal, rosulate.................... 26. *Crepis*

1. VERNONIA Schreber

Erect herbs, woody vines, or trees. Leaves alternate, entire or toothed. Heads terminal or axillary, cymose or panicled. Involucre as long as or shorter than the flowers, the bracts in many series, the outer ones shorter. Flowers all perfect, the corollas all equal, tubular, slender, 5-lobed. Achenes striate, ribbed or angled; pappus hairs numerous. (In honor of W. Vernon, an early English botanist.)

Species more than 400, chiefly tropical, about 12 in the Philippines.

Heads about 8 mm in diameter.................... 1. *V. patula*
Heads about 2.5 mm in diameter.................... 2. *V. cinerea*

1. V. PATULA (Ait.) Merr. (*V. chinensis* Less.). Bulac-manoc (Tag.).

An annual, erect, rather stout herb with spreading branches, 1 m high or less, more or less ashy-puberulent. Leaves sessile or petioled, ovate to elliptic-lanceolate, 2 to 12 cm long, shallowly toothed. Heads 40- to 70-flowered, ovoid, peduncled, in leafy panicles, scattered or in pairs, about 1 cm long, 8 mm in diameter, the involucral bracts green, the flowers pale-purple.

In open waste places, occasional, fl. Sept.–Apr., widely distributed in the Philippines and undoubtedly an introduced plant here. India to southern China and Malaya.

2. V. CINEREA (L.) Less.

An erect, slender, sparingly branched, somewhat pubescent, annual herb 20 to 80 cm high. Leaves petioled, oblanceolate to obovate, acute or obtuse, shallowly toothed, 2 to 6 cm long. Heads small, peduncled, in open, lax corymbs, about 7 mm long, 2.5 mm in diameter, the flowers rather bright-purple, about 20 in each head, twice as long as the involucral bracts. (Fl. Filip. *pl. 280.*)

In open waste places, common, fl. all the year; throughout the Philippines, but certainly introduced. Tropical Africa and Asia through Malaya to Australia.

2. EUPATORIUM Linnaeus

Perennial herbs or undershrubs with opposite or alternate leaves. Heads corymbose, many-flowered, homogamous, the involucre long or short, of few- to many-seriate subequal bracts, or the outer bracts shorter; receptacle naked. Corollas all equal, regular, tubular, slender, 5-lobed or toothed. Anthers appendaged, the base obtuse. Style-arms long. Achenes truncate, 5-angled or 5-ribbed; pappus-hairs in one series, many, rigid, scabrid. (Dedicated to Eupator Mithridates, who is said to have used the European species in medicine.)

Species more than 400, chiefly American, 4 or 5 in the Philippines, the following introduced and cultivated.

*1. E. TRIPLINERVE Vahl (*E. ayapana* Vent.). Ayapana (Sp.-Fil.).

A glabrous perennial herb, the stems suffrutescent at the base, ascending. Leaves opposite, lanceolate, triplinerved, narrowed at both ends, acute or acuminate, distantly denticulate or nearly entire, 5 to 8 cm long. Corymbs lax, the heads many, pedicelled, about 20-flowered, the involucral bracts in about one series, with some shorter outer ones, linear, acuminate, unequal, somewhat puberulent.

Occasionally cultivated, Pasay, said to flower in January. A native of tropical America, now widely distributed in the tropics, cultivated and spontaneous.

3. AGERATUM Linnaeus

Erect, branched, pubescent herbs. Leaves opposite or the upper ones alternate. Heads white or pale-blue, corymbose or panicled. Involucre of 2 or 3 series of linear, subequal bracts. Corollas all tubular, regular, 5-cleft. Achenes 5-angled; pappus of 5, short, free or connate scales. (A name used by Dioscorides for the everlastings.)

Species about 16, all American, 1 now in all tropical countries.

1. A. CONYZOIDES L. Bulac-manoc (Tag.).

An annual, erect, branched, somewhat aromatic, hispidly hairy, slender, rather stout herb 30 to 60 cm high. Leaves ovate, crenate, acute, 5 to 13 cm long. Heads small, in rather dense terminal corymbs, about 5 mm long and thick, the bracts green, acute or acuminate. Flowers numerous, white or very pale-blue. Achenes black, the pappus of 5 awned scales, often serrate below. (Fl. Filip. *pl. 368.*)

A common weed in waste places, fl. all the year; throughout the Philippines. A native of Mexico, now in all tropical countries.

4. EMILIA Cassini

Annual or perennial erect herbs, glabrous or hairy, often glaucous. Leaves mostly radical, crowded, petioled, entire, toothed, or lyrately lobed, those of the stem few, clasping, smaller. Heads long-peduncled, loosely corymbose, homogamous, red or purplish. Flowers all perfect, tubular, the limb long, 5-toothed. Involucre cylindric, the bracts 1-seriate, free or cohering below, the bracteoles none. Achenes subterete or angled, 5-ribbed; pappus-hairs copious, soft, slender, white.

Species 6 or 8 in tropical Africa, Asia, and Malaya, about 3 in the Philippines.

1. E. SONCHIFOLIA (L.) DC. Tugulinao (Tag.).

An erect or ascending, variable, glabrous or sparingly hairy, more or less branched plant 10 to 40 cm high. Leaves somewhat fleshy, the lower ones lyrate-lobed or sinuate-toothed, 5 to 10 cm long, the upper ones much smaller and usually entire, all sessile, and somewhat clasping the stems. Heads 12 to 14 mm long, long-peduncled, the flowering branches usually dichotomously branched. Involucre green, cylindric, somewhat inflated below, the bracts green, about as long as the purple flowers. Achenes about 2.4 mm long, narrowly oblong, ribbed, the pappus white, soft, copious. (Fl. Filip. *pl. 282.*)

Occasional in open grass lands, waste places, etc., fl. Oct.–Apr.; widely distributed in the Philippines, and undoubtedly introduced. Tropical Asia, Africa, and Malaya, apparently an introduced plant in tropical America.

5. ELEPHANTOPUS Linnaeus

Stiff, erect, simple or branched herbs. Leaves alternate. Heads few-flowered, homogamous, solitary or clustered in involucrate fascicles at the ends of the branches or in pairs and spicately arranged. Involucral-bracts about 8; dry, stiff, alternately flat and conduplicate; receptacle naked. Flowers all equally 4-lobed, cleft on one side, the lobes somewhat spreading. Achenes truncate, ribbed; pappus-bristles rigid, shining, slender and dilated below, or chaff-like. (Greek "elephant" and "foot" suggested by the form of the involucrate heads of some species.)

Species about 12 in tropical America, 3 introduced in the Philippines.

1. Clusters of heads at the ends of the branches, surrounded by an involucre of usually 3 leaf-like bracts.
    2. Leaves forming a basal rosette; flowers purple..................... 1. *E. scaber*
    2. Leaves scattered along the stem; flowers white..................... 2. *E. mollis*
1. Clusters of heads spicately arranged, not involucrate........ 3. *E. spicatus*

1. **E. SCABER L.**

A rather coarse, rigid, erect herb 30 to 60 cm high, more or less scabrid and villous. Leaves mostly in a basal rosette, oblong-obovate to oblong-oblanceolate, somewhat crenate, obtuse or subacute, base narrowed, 10 to 25 cm long, those of the stem few, much smaller. Stems forked, the branches few, stiff. Heads in clusters at the ends of the branches enclosed by usually 3 leaf-like bracts, which are ovate to oblong-ovate, 1 to 1.5 cm long, cordate at the base. Heads many in each cluster, crowded, each head about 4-flowered, the involucral-bracts 8 to 10 mm long. Corollas 8 to 9 mm long, purple. Achenes ribbed, the pappus of 4 to 6, long, rigid bristles.

In open grass lands, waste places, etc., fl. Dec.–April; widely distributed in the Philippines. Tropics generally, but undoubtedly a native of tropical America.

2. **E. MOLLIS HBK.**

A tall, erect, more or less hirsute herb 0.8 to 1.2 m high, not branched except the inflorescence. Leaves scattered along the stem, not basal, oblong to oblong-elliptic, acute, base narrowed and decurrent, crenate, 8 to 20 cm long. Branches of the inflorescence few, usually forked, subtended by much-reduced leaves. Clusters of heads terminating the branches surrounded by about 3, ovate, cordate, 1 to 1.5 cm long, leaf-like bracts. Heads 4-flowered, numerous in each cluster, the involucral-bracts lanceolate, acuminate, about 7 mm long, green. Corollas white, 5 to 6 mm long. Pappus of 4 or 5 long, bristle-like hairs.

In thickets etc., Masambong, fl. Dec.–April; widely distributed in the Philippines. A native of tropical America, now thoroughly naturalized here; not reported from any other part of the Orient, other than Guam.

3. E. **SPICATUS** Aubl.

An erect, rather stiff herb 20 to 60 cm high, sparingly appressed-pubescent or nearly glabrous. Leaves oblong-obovate, obtuse, base narrowed, crenate, 9 to 14 cm long, those of the upper part of the stem smaller. Heads about 1.5 cm long, sessile, in clusters of 2 to 5, in the axils of very much reduced leaves, arranged along the few, elongated, spike-like branches of the inflorescence. Involucral-bracts green, the outer much smaller than the inner ones. Achenes ribbed, hirsute, the pappus-hairs 4, dilated and laciniate-cleft at the base, unequal, 2 straight, 2 longer, abruptly recurved and again curved upward. Corolla white, about 7 mm long.

In open waste places, fl. Dec.–April; common and widely distributed in the Philippines. Introduced from tropical America, but reported from no other part of the Orient except Guam and southern China.

5. SPHAERANTHUS Linnaeus

Annual, erect or spreading, rather coarse herbs. Leaves alternate, toothed, decurrent on the branches. Heads small, in terminal, solitary, globose clusters. Flowers heterogamous, the outer ones few or many, female, slender, the limb minutely 2- or 3-toothed. Disk-flowers perfect, solitary or few, the limb 4- or 5-toothed. Involucre narrow, the bracts dry, acute, unequal. Achenes oblong, somewhat compressed, the pappus none. (Greek "sphere" and "flower," from the globose inflorescence.)

Species about 8, tropical Africa, Asia, to Australia, 1 in the Philippines.

1. S. **AFRICANUS** L.

A more or less pubescent or nearly glabrous, rather coarse, branched herb less than 1 m high, the branches spreading the stems and branches prominently 3-winged by the decurrent leaves. Leaves obovate to oblong-obovate, sessile, 4 to 13 cm long, finely toothed. Heads very numerous, in dense, globose clusters about 1 cm in diameter, solitary, on erect, winged peduncles. Flowers greenish-white.

In waste places, occasional, fl. Sept.–April; of local occurrence about towns in the Philippines, certainly an introduced plant here. Tropical Africa and Asia, through Malaya to Australia.

7. BLUMEA DeCandolle

Annual or perennial, glandular, pubescent, or glabrous, usually erect, simple or branched herbs, often aromatic. Leaves alternate, toothed or lobed. Heads small, usually numerous, scattered or fascicled in corymbose panicles or in spike-like racemes, yellow or purplish. Involucre ovoid or campanulate, the bracts narrow, many-seriate, the outer ones smaller. Outer flowers female, very numerous, slender, tubular, the limb 4- or 5-toothed. Inner perfect flowers few, stouter. Achenes small, cylindric or angled; pappus white or brownish, the hairs 1-seriate, slender. (In honor of C. L. Blume, a Dutch botanist.)

Species about 75, tropical Asia, and Africa, through Malaya to Australia, about 20 in the Philippines.

1. A coarse, erect, stout, suffrutescent herb, or a shrub 2 to 3 m high, the leaves very strongly aromatic.. 1. *B. balsamifera*
1. Herbs, branched or simple; 20 to 120 cm high, slightly or not aromatic.
    2. Heads very numerous, crowded in dense spike-like racemes or panicles; softly pubescent plants.

3. Leaves obovate, toothed; flowers purplish........................ 2. *B. mollis*
3. Leaves oblong, lyrately lobed; flowers yellow.............. 3. *B. laciniata*
2. Heads few, in open panicles; plant only slightly pubescent; leaves oblong-obovate, somewhat spiny-toothed.............................. 4. *B. tenera*

1. **B. balsamifera** (L.) DC. Sambong (Tag.).

A coarse tall, erect, suffrutescent, strongly aromatic herb, densely and softly pubescent, 1.5 to 3 m high, stems up to 2.5 cm in diameter. Leaves 7 to 20 cm long, elliptic- to oblong-lanceolate, serrate, acute or obtuse, base narrowed to the short petiole, which is often auricled or appendaged. Inflorescence a large, branched, leafy panicle. Heads peduncled, on the ultimate branches, numerous, 6 to 7 mm long, cylindric, the involucral bracts green, narrow, pubescent, the flowers yellow. (Fl. Filip. *pl. 403.*)

In open waste places, fl. Feb.–April.; widely distributed in the Philippines. India to Malaya.

2. B. MOLLIS (Don) Merr. (*B. wightiana* Auct.).

An erect, somewhat branched, usually densely white-villous herb 20 to 40 cm high, slightly aromatic. Leaves petioled, thin, obovate, rounded or obtuse, 1.5 to 4 cm long, irregularly toothed but not lobed. Heads numerous, 4 to 5 mm long, crowded or fasciculate, in oblong, spiciform, sometimes paniculate inflorescence, the bracteoles densely pilose, green or purplish. Flowers with purple tips.

In open, dry or damp places, fl. Jan.–April; widely distributed in the Philippines, and undoubtedly introduced. India to tropical Africa, and China, southward through Malaya to Australia.

3. B. LACINIATA (Roxb.) DC.

An erect, rather coarse, often much-branched, scarcely aromatic, pubescent plant 0.8 to 1.2 m high, the stems very leafy. Leaves 8 to 14 cm long, deeply lyrately lobed, the lobes coarsely toothed, pubescent on both surfaces. Heads many, ovoid, 6 to 7 mm long, 5 mm in diameter, nodding, loosely clustered and racemosely arranged on the panicle branches, forming an oblong inflorescence 25 to 50 cm in length. Involucral bracts green, softly pubescent. Flowers yellow.

In open dry waste lands, occasional, fl. Jan.–April; widely distributed in the Philippines and probably introduced. India to China and Malaya.

4. **B. tenera** Merr.

A slender, erect, slightly or not at all branched herb 20 to 50 cm high, the stems nearly glabrous. Leaves oblong-oblanceolate, sessile or nearly so, acute, base gradually narrowed, margins distantly and somewhat spiny-toothed, not at all lobed, 2.5 to 8 cm long, the lower surface slightly papillate-pilose. Heads panicled, few, 6 to 7 mm long, the bracts linear, green, slightly pubescent or nearly glabrous. Flowers yellow. Achenes angled, slightly hairy, 1.2 mm long. Central perfect flowers few, the corolla 4-toothed.

In open grass lands, La Loma to Maypajo, rare, fl. Nov.–Jan. Known only from the Philippines.

8. **PLUCHEA** Cassini

Erect branched shrubs, more or less pubescent. Leaves alternate, toothed. Heads small, in terminal leafless corymbs, heterogamous, disk-like, lilac, the flowers tubular, the outer ones female, many-seriate, slender, the disk-flowers perfect, few, tubular, limb 5-fid. Involucre ovoid or campanulate, the bracts ovate, dry, rigid, usually broad; receptacle flat, naked. Anther-cells tailed at the base. Achenes 5- to 10-ribbed, those of the female flowers with no pappus, those of the perfect flowers with 2 or 3 or no pappus-hairs. (Dedicated to the Abbe Pluche.)

Species about 10 in tropical Asia, Africa, and America, 2 or 3 in the Philippines.

1. **P. indica** (L.) Less. Calapini (Tag.).

An erect, much-branched shrub 1 to 2 m high. Leaves oblong-obovate to oblong-elliptic, apiculate, acute, or obtuse, slightly and irregularly toothed, 1.5 to 4 cm long, base wedge-shaped. Inflorescence a compound, terminal, slightly pubescent corymb 5 to 11 cm long. Heads numerous, about 5 mm long, the bracts ovate, acute or obtuse, the inner ones gradually longer. Flowers numerous, pink-purple or lilac. Achenes minute, ribbed, the pappus white, scanty.

In thickets and open places subject to the influence of salt or brackish water, Malabon, Pasay, etc., fl. more or less all the year; throughout the Philippines near the sea. India to southern China and Malaya.

9. GRANGEA Adanson

Ascending or prostrate, villous, much-branched herbs. Leaves alternate, pinnatifid. Heads globose, terminal or leaf-opposed, yellow, not rayed. Outer flowers in 1 to many series, female, slender, the disk-flowers perfect, slender, the limb 4- or 5-cleft. Bracts of the involucre in few series; receptacles convex or conic, glabrous. Achenes flattened or nearly cylindric; pappus cupular.

Species 3 or 4 in tropical Asia and Africa, 1 introduced in the Philippines.

1. G. MADERASPATANA (L.) Poir.

Stems spreading from the root, branched, up to 70 cm in length, all parts pubescent. Leaves 2 to 5 cm long, sinuately pinnatifid, the lobes toothed. Heads globose, leaf-opposed, short-peduncled, 8 to 10 mm in diameter. Flower small, very numerous, yellow. Achenes about 2 mm long, cylindric, the pappus-hairs connate into a short, fimbriate tube.

In open waste places, occasional, fl. March–May; of very local occurrence in the Philippines, and undoubtedly introduced. Tropical and subtropical Asia and Africa.

10. CROSSOSTEPHIUM Lessing

An undershrub, the branchlets and leaves densely gray-pubescent. Leaves alternate, entire or 2- to 5-toothed, or -lobed at the apex. Heads small, disk-like or depressed-globose, short-peduncled, in simple or paniculate, leafy, terminal racemes. Outer two series of flowers female, with tubular, shortly 2- or 3-toothed corollas; disk flowers perfect, regular, tubular, shortly 5-fid. Achenes 5-angled; pappus short, lacerate, or of small, divided scales. (Greek "scale" and "crown," in allusion to the pappus characters.)

A monotypic Chinese genus, introduced and cultivated in the Philippines.

* 1. C. ARTEMISIOIDES Less. Ajenjo (Tag.).

An erect or spreading, branched undershrub 10 to 40 cm high. Leaves alternate, crowded toward the ends of the branches, 2 to 3 cm long, narrowly obovate-cuneate, densely and softly pubescent with short, grayish-white hairs, base long-narrowed, apex prominently 3- to 5-toothed or -lobed, the lobes ovate to narrowly oblong. Heads in the upper axils, peduncled, forming terminal leafy racemes, subglobose, 4 to 5 mm in diameter.

A species of Chinese origin, introduced and cultivated in Manila, rarely flowering. Otherwise known only from China.

11. SYNEDRELLA Gaertner

Annual, erect, branched, pubescent herbs. Leaves opposite, petioled, toothed. Heads small, axillary, heterogamous, radiate, the ray-flowers female, in 1 or 2 series, yellow, the ligule short, 2- or 3-toothed. Disk-flowers perfect, tubular, the limb 4-toothed. Involucre ovoid or oblong, the bracts few, 1 or 2 outer ones usually foliaceous, the inner ones dry, like disk-scales; receptacle small, with scarious flat scales. Achenes of the ray-flowers dorsally compressed, 2-winged, the wings lacerate, those of the disk few, compressed or 3-angled, often muricate, the angles of both terminating in spines.

Species 2 in tropical America, 1 now cosmopolitan in the tropics.

1. S. NODIFLORA (L.) Gaertn.

An erect, dichotomously branched, glabrous or sparingly hairy, annual herb, 1 m high or less. Leaves opposite, petioled, ovate-lanceolate to elliptic-ovate, acute, finely toothed, base decurrent, 3-nerved, 7 to 13 cm long. Heads sessile, axillary and terminal, nearly 1 cm long, cylindric, few-flowered. Flowers yellow. Achenes black, the spines stout, sharp. (Fl. Filip. *pl. 404.*)

In open waste places, very common, fl. all the year; throughout the Philippines, and certainly introduced. Probably a native of tropical America, now in most warm countries.

12. ARTEMISIA Linnaeus

Erect herbs or undershrubs, usually strong-scented. Leaves alternate, entire to pinnatisect. Heads small, racemose or panicled, solitary, or fascicled along the branches. Flowers all tubular, the outer ones female, 1-seriate, slender, 2- or 3-toothed; disk-flowers perfect, the bracts few-seriate, outer shorter. Achenes small, faintly striate; pappus none. (In memory of Artemisia, wife of Mausolus.)

Species about 150 in north temperate regions, few in South America, 2 in the Philippines, the following introduced.

1. A. VULGARIS L. Camaria, Damong-maria (Tag.).

An erect, rank smelling, often suffrutescent herb 0.5 to 0.8 m high, gray-pubescent, the stems leafy, branched. Leaves pinnately lobed, 5 to 14 cm long, gray beneath, nearly glabrous above, the lobes spreading or ascending, irregularly coarsely toothed or lobulate, with stipule-like basal lobes. Heads numerous, ovoid, 3 to 4 mm long, nearly or quite sessile, secund, seriate or fascicled on the elongated, spike-like, ascending panicle-branches. (Fl. Filip. *pl. 329.*)

Cultivated, fl. March–June and probably in other months; introduced from Europe and widely distributed in the Philippines in cultivation, thoroughly naturalized in some regions. A native of Europe and Asia, now found in many other regions.

13. EPALTES Cassini

Herbs with alternate, usually decurrent, toothed leaves. Heads small, solitary or corymbose, globose or disciform, heterogamous, the flowers tubular, the outer ones female, many-seriate, the corolla much shorter than the style, 2- or 3-toothed. Disk flowers perfect, tubular, 3- to 5-fid. Anther-bases sagittate. Achenes of female flowers subterete, 5- to 10-ribbed, the pappus none; of the perfect flowers usually abortive, pappus hairs 2 or 3, or none. Involucre broad, the bracts many-seriate, the receptacle naked.

Species about 10, in most tropical countries, 1 in the Philippines.

1. **E. australis** R. Br.

Root stout, woody, the stems rather slender, spreading, prostrate, or ascending, branched, 6 to 15 cm long. Leaves obovate to oblong-obovate, rounded, rather coarsely toothed, 1.5 to 2.5 cm long, narrowed below to the short petiole. Heads solitary, axillary, shortly peduncled, depressed-globose, about 5 mm in diameter, the involucre hemispheric, green, the bracts several-seriate. Flowers very numerous, minute, purplish, including the achenes about 2 mm long.

In old rice paddies near La Loma fl. Dec.–Jan., and probably in other months, very rare; of very local occurrence in the Philippines. India to Australia.

14. CENTIPEDA Loureiro

Small, spreading or ascending, annual, hairy or nearly glabrous herbs. Leaves alternate, toothed. Heads small, sessile, axillary, globose or disciform, yellow. Outer flowers female, many-seriate, the corolla small; disk-flowers perfect, few, the corolla campanulate, 4-fid. Involucre hemispheric, the bracts 2-seriate. Achenes 4-angled, hairy on the angles; pappus none. (Latin "hundred" and "feet" in reference to its prostrate habit.)

Species 4, in Asia, Australia, and in South America.

1. **C. minima** (L.) Willd. (*C. orbicularis* Lour.).

A prostrate or ascending, slender herb, the branches numerous, spreading from the root, 8 to 20 cm long, somewhat woolly or nearly glabrous, leafy. Leaves 1 cm long or less, oblong-obovate to oblanceolate, with few coarse teeth. Heads sessile, globose, 3 to 4 mm in diameter, many-flowered. Achenes about 1 mm long.

In open waste places, occasional, fl. Dec.–June; widely distributed in the Philippines, undoubtedly introduced. India, through Malaya to Australia and Polynesia.

15. ERIGERON Linnaeus

Erect, branched, often coarse herbs with alternate, toothed, usually sessile leaves. Heads panicled, heterogamous, rayed, the ray-flowers female in several rows, their ligules short or long. Disk-flowers perfect, tubular, 6-cleft. Involucre ovoid or hemispheric, the bracts narrow, equal. Receptacle flat or convex, naked. Achenes narrow, compressed, the pappus a single row of slender bristles or often double, the outer series often reduced to a few short hairs or bristles. (Greek "spring" and "an old man" suggested by the hoariness of some vernal species.)

Species about 100, chiefly in the north temperate zone, fewer in the tropics, 1 introduced in the Philippines.

1. E. **LINIFOLIOUS** Willd.

A stout, or sometimes slender, erect, branched annual 0.5 to 2 m high, more or less hirsute. Leaves lanceolate to oblanceolate 6 to 15 cm long, 1 to 4 cm wide, coarsely toothed or sublobed. Panicles terminal, ample, the heads numerous, peduncled, narrowly ovoid, 6 to 7 mm long, the bracts green. Flowers greenish-white, many in each head.

In waste places, occasional, fl. Oct.–April; widely distributed in the Philippines. A native of Europe, introduced here; now a common weed in many warm and tropical countries.

16. TAGETES Linnaeus

Erect, branched, usually rank-scented, glabrous herbs, the leaves and involucral-bracts with scattered oil-glands. Leaves opposite, pinnately dissected or lobed. Heads long-peduncled, medium or large, yellow, solitary. Involucre ovoid or cylindric, the bracts 1-seriate, connate nearly to their tips. Ray-flowers 1-seriate, female, the ligule entire or 2-toothed, short or long; disk-flowers perfect, regular, tubular, limb usually somewhat enlarged, 5-fid. Achenes linear, narrowed below, compressed or angled; pappus-scales few, aristate. (From Tages, an ancient Tuscan god.)

Species about 20, natives of tropical America, a few now widely cultivated, 1 or 2 introduced in the Philippines.

1. T. **ERECTA** L. Amarilla (Sp.-Fil.); Marigold.

A rather coarse, erect, glabrous, branched, rank-smelling annual herb 0.4 to 1 m high. Leaves 4 to 11 cm long, very deeply pinnatifid, the lobes lanceolate, coarsely and sharply toothed, 1 to 2.5 cm long. Heads solitary, long-peduncled, the peduncle thickened upward, 2.5 to 3.5 cm long, 2 to 4 cm in diameter, the involucre green. Flowers pale- to deep-yellow. Achenes 6 to 7 mm long. (Fl. Filip. *pl. 404.*)

Commonly cultivated, fl. all the year. In most Philippines towns in cultivation, in some localities spontaneous and naturalized. A native of Mexico.

17. CHRYSANTHEMUM Linnaeus

Erect, annual or perennial, aromatic herbs, with alternate, entire, toothed or lobed leaves. Heads large, terminal, peduncled, sometimes corymbose. Ray-flowers 1-seriate, female, the ligule spreading, white, yellow, or pink; disk-flowers numerous, perfect, the limb 4- or 5-fid. Involucre hemispheric or broader, the bracts many-seriate, broad. Achenes subterete or angled, ribbed or winged; pappus none or short, sometimes a cup or auricle. (An ancient Greek name, i. e., "golden flower.")

Species 80 or more in the north temperate zone, 3 introduced and cultivated in the Philippines.

1. More or less pubescent; leaves pinnately lobed; heads corymbose.
    2. Flowers yellow, with but one or two rows or ray-flowers, usually less than 2.5 cm in diameter.......................... 1. *C. indicum*
    2. Flowers white, yellow, or variously colored, with many rows of ray-flowers, exceeding 2.5 cm in diameter.......................... 2. *C. sinense*
1. Quite glabrous, the leaves bipinnately parted, when fresh fleshy and brittle; heads solitary, long-peduncled, yellow............ 3. *C. coronarium*

* 1. C. **INDICUM** L. Manzanilla (Sp.-Fil.).

An erect or ascending, perennial, aromatic herb 30 to 60 cm high, somewhat pubescent. Leaves thin, ovate to oblong-ovate in outline, 4 to 6 cm long, pinnately lobed, the lobes 2 or 3 on each side, ovate or oblong-ovate, sharply toothed. Heads yellow, peduncled, corymbosely panicled, 1.5 to 2.5 cm in diameter.

Cultivated only, fl. Jan.–Mar., and probably in other months. A native of China and Japan, now cultivated in most warm countries.

*2. C. SINENSE Sabine. Manzanilla, Rosas de Japon (Sp.-Fil.).

Similar to the preceding, but usually taller, the heads white or variously colored, with us up to 5 cm or more in diameter, composed of numerous rows of ray-flowers. Perhaps only a form of the preceding developed by cultivation.

Cultivated only, fl. Dec.–Feb., introduced from China or Japan. Cultivated in all warm countries, exceedingly variable.

*3. C. CORONARIUM L. T'ung hao (Chinese).

An erect, glabrous, somewhat fleshy, slightly aromatic, branched, annual herb 50 cm high or less, the leaves auricled and clasping at the base, 10 cm long or less, bipinnately parted, the lobes narrow, entire or toothed, thick, oblong to lanceolate, when fresh fleshy and brittle. Heads solitary, long-peduncled, terminating the branches, yellow, 2 to 3.5 cm in diameter.

Cultivated by Chinese gardeners, fl. Feb.–Apr. A native of the Mediterranean regions, now cultivated in most warm countries, introduced in the Philippines from southern China.

18. ENHYDRA Loureiro

Spreading or ascending, branched, somewhat fleshy marsh-herbs with opposite, oblong to lanceolate, sessile, toothed leaves. Heads axillary, sessile, solitary. Involucral bracts 4, large, foliaceous, green, in 2 opposite pairs, longer than the heads. Ray-flowers male, in several series, the ligule very small, broad, 3- or 4-toothed. Disk-flowers perfect, fertile, or the innermost sterile, the limb tubular, 5-fid. Receptacle convex, the scales enclosing the flowers and achenes. Achenes oblong, compressed; pappus none. (Greek "growing in or near water.")

Species about 6, tropical and subtropical, 1 in the Philippines.

1. **E. fluctuans** Lour.

A prostrate, spreading, annual herb, the stems somewhat fleshy, 30 cm long or more, branched, rooting at the lower nodes, somewhat pubescent. Leaves sessile, linear-oblong, acute or obtuse, 3 to 5 cm long, base usually truncate, margins somewhat toothed. Heads solitary, axillary, sessile, the outer pair of involucral bracts 1 to 1.2 cm long, ovate, obtuse, the inner pair somewhat smaller, the heads, excluding the bracts, less than 1 cm in diameter, the flowers white or greenish-white. Achenes enclosed by the rigid receptacle-scales.

In open marshy places, not common, fl. March–Apr., and probably in other months; of very local occurrence in the Philippines. India to China southward to Malaya.

19. ECLIPTA Linnaeus

Strigose or hirsute, erect or prostrate, slender or coarse, annual herbs. Leaves entire or toothed, opposite. Heads small, axillary and terminal, white, peduncled, heterogamous, rayed. Involucre green, ovoid to broadly campanulate, the bracts few, 2-seriate, the outer ones broad, the receptacle flat or nearly so, the paleae narrow. Ray-flowers female, about 2-seriate, fertile or sterile, white, the ligule small, narrow, entire or 2-toothed. Disk-flowers very numerous, perfect, fertile, tubular, the limb 4- or 5-fid. Achenes compressed, truncate or 2-aristate; pappus none. (Greek "to be deficient," alluding to the absence of pappus.)

Species 3 or 4, of wide tropical distribution, at least 2 in the Philippines.

Coarse, erect, more or less densely hirsute, the leaves up to 9 cm long, somewhat toothed.......... 1. *E. zippeliana*
Rather slender, usually prostrate or spreading, strigillose but not hirsute, the leaves 1 to 5 cm long, subentire.......... 2. *E. alba*

1. E. ZIPPELIANA Bl.

A very coarse, densely hirsute, erect, branched herb 0.3 to 1.5 m high, the stems often reddish. Leaves 3 to 9 cm long, sessile, oblong-obovate to lanceolate, hirsute, acuminate, base narrowed, margins irregularly and rather coarsely spinulose-toothed. Heads ovoid, 6 to 7 mm long, 5 to 6 mm in diameter, larger in fruit, the peduncles hirsute, 1 cm long or less, the bracts green, hairy, as long as or exceeding the flowers. Ligules of the ray-flowers about 1.5 mm long. Achenes black, 3 mm long, apex hairy.

In open damp places, scattered, fl. all the year; of wide Philippine distribution, apparently not native. Java, and probbly in other parts of Malaya.

2. E. ALBA (L.) Hassk.

A decumbent, spreading, or sometimes suberect, strigillose, annual herb, the stems rather slender, usually reddish, up to 30 cm in length or more. Leaves sessile, entire or slightly toothed, linear-oblong to lanceolate, acute or blunt, 1 to 5 cm long. Peduncles 3 cm long or less. Heads ovoid, 5 to 6 mm long, about 5 mm in diameter, in fruit much wider, the bracts strigillose but not hirsute. Achenes black, 3 mm long, apex glabrous, or slightly hairy.

In open waste places, low damp lands, etc., common, fl. all the year; throughout the Philippines, certainly introduced. All tropical and subtropical countries.

20. HELIANTHUS Linnaeus

Coarse, erect, simple or branched, annual or perennial herbs. Leaves opposite or alternate, ample, toothed or lobed. Heads often very large, solitary or corymbose, long-peduncled. Ray-flowers several to many, yellow. Disk-flowers perfect, very numerous, brown or yellow. Involucre-bracts herbaceous or foliaceous, imbricate. Receptacle flat or convex, the persistent chaffy scales embracing the 4-angled, compressed, smooth achenes. Pappus very deciduous, of 2, thin, chaffy scales on the principal angles, and sometimes 2 or more intermediate ones. (Greek "sun" and "flower.")

Species 55, in temperate and tropical America, 2 introduced and cultivated in the Philippines.

* 1. H. ANNUUS L. Girasol (Sp.); Sunflower.

A coarse, stout, rough, erect, annual herb 1 to 3 m in height. Leaves ovate, serrate, acuminate, the lowest ones sometimes cordate, 10 to 25 cm long. Heads usually solitary, often very large, up to 20 cm in diameter, the rays yellow, spreading.

Occasionally cultivated, fl. Oct.–May. A native of tropical America, introduced and cultivated here for ornamental purposes, not spontaneous.

Helianthus cucumerifolius Torr. and Gray, a native of the south-eastern United States and Mexico is a recent introduction, occasionally found in cultivation. It differs from *H. annuus* in its smaller size, slender, much-branched, mottled stems, long-peduncles, much smaller heads and caudate-acuminate involucral-bracts.

21. WEDELIA Jacquin

Scabrid, wide-spreading, coarse or slender, often climbing herbs. Leaves opposite, ovate. Heads axillary or terminal, peduncled, yellow. Ray-flowers female, 1-seriate, the ligule spreading, often toothed. Disk-flowers many, perfect, the limb tubular, 5-toothed. Involucral-bracts about 2-seriate, the outer few often foliaceous. Receptacle flat, the scales enclosing the flowers. Achenes cuneate-oblong or obovoid, angled or compressed, margins obtuse or thickened; pappus none or a toothed cup or ring, or of scales. (In honor of G. W. Wedel, a German botanist.)

Species about 45, tropical and subtropical, 1 or 2 in the Philippines.

Leaves ovate, 3 to 12 cm wide; a coarse spreading or climbing plant. 1. *W. biflora*

Leaves oblong to oblong-lanceolate, 1.5 cm wide or less, base narrowed; a slender plant........ 2. *W. prostrata*

1. **W. biflora** (L.) DC. Hagonoy (Tag.).

A climbing, scaberulous, herbaceous vine. Leaves ovate, acuminate, rather coarsely serrate, 6 to 18 cm long, base rounded, triplinerved, the petioles 2 to 6 cm long. Heads 3 cm in diameter or less, peduncled, 1 to 3, sometimes more, in the upper axils, the peduncles 7 to 10 cm long. Involucral-bracts narrowly oblong, somewhat recurved, pubescent, equaling or exceeding the disk. Ray-flowers 6 to 15, the ligule oblong, yellow, 3-toothed, 6 to 12 mm long. Disk-flowers numerous, yellow or yellowish-brown.

Along the seashore, in thickets, common, fl. all the year; in littoral districts throughout the Philippines. India to China through Malaya to Polynesia.

2. **W. PROSTRATA** (H. & A.) Hemsl.

A slender, spreading, strigose-pubescent plant, the branches usually less than 50 cm long. Leaves oblong to oblong-lanceolate, 2 to 4.5 cm long, narrowed at both ends, entire or obscurely toothed, strigose on both surfaces. Heads peduncled, about 1 cm in diameter, yellow, the bracts oblong-ovate, not spreading.

In open grassy places near the walled city, rare, fl. Jan.–March, and probably in other months; otherwise unknown in the Philippines, and undoubtedly introduced here. Japan to Formosa and southern China.

22. COSMOS Linnaeus

Erect branched herbs with lobed to pinnately divided leaves. Heads peduncled, heterogamous, the ray flowers variously colored or white. Involucre subhemispheric, the bracts 2-seriate, connate near the base. Receptacle flat, somewhat scaly. Ray-flowers ligulate, the limb spreading, usually toothed. Disk-flowers perfect, tubular, the limb 5-toothed. Achenes narrow, somewhat 5-angled, beaked at the top, with 2 to 4, barbed or hispid, deciduous awns. (Greek "ornament.")

Species 10 or more in tropical America, 2 introduced in the Philippines.

1. C. CAUDATUS HBK.

A coarse, erect, branched herb 0.8 to 1.5 m high, glabrous. Leaves up to 20 cm long, 2- or 3-pinnately dissected, the lobes narrow, oblong, mostly acuminate. Heads in the upper axils, long-peduncled, about 3 cm in diameter, the involucral-bracts green, linear, about 1.5 cm long. Ray-flowers pink or pale-purple, about 1.5 cm long, 3-cleft. Disk-flowers yellow. Achenes fusiform, about 2 cm long, including the long, slender scabrid beak which bears 2 slender, spreading retrorsely scabrid awns. (Fl. Filip. *p. 287.*)

In waste places, dry soil, common, fl. all the year; introduced from tropical America at an early date, now thoroughly naturalized and widely distributed in the Philippines.

Some horticultural forms, chiefly with yellow flowers, are cultivated by local gardeners.

23. BIDENS Linnaeus

Annual, erect, branched herbs, with opposite, toothed or incised or 1- or 2-pinnate leaves. Heads corymbosely panicled, rayed, the rays yellow or nearly white, the disk-flowers perfect. Involucre green, ovoid or cylindric, the bracts about 2-seriate, their bases connate, the outer ones narrow, the inner broader. Anther-cells entire or subsagittate. Achenes 4-angled or compressed, linear, the pappus of 2 to 4, rigid, retrosely barbed bristles. (Latin "two" and "tooth," from the 2-awned achenes of some species.)

Species about 50, mostly American, about 3 in the Philippines.

1. B. PILOSA L. Beggar-ticks.

An erect, branched, usually more or less hairy herb 0.2 to 1.5 m high, very variable. Leaves 15 cm long or less, the upper one usually much smaller, 1- or 2-pinnatifid, the segments ovate-lanceolate, acuminate, toothed, 2 to 5 cm long. Heads long-peduncled, about 8 mm long in flower, the disk-flowers brown or yellowish, the rays yellow or nearly white, the inner involucral-bracts with broad scarious margins. Achenes linear, black, 1 to 1.5 cm long, 4-awned at the apex.

In waste places, Malabon, fl. Oct.–Nov., and probably in other months; widely distributed in the Philippines, and certainly introduced. All warm countries.

24. LACTUCA Linnaeus

Erect, simple or branched, usually glabrous herbs with milky sap. Leaves radical and alternate, entire, toothed or variously pinnate or pinnatifid, often stem-clasping and auricled. Heads sessile or peduncled, panicled, homogamous. Flowers all ligulate, yellow. Involucre usually narrow, the bracts few-seriate, thin; receptacle flat, naked. Achenes compressed, ovoid-oblong to narrow, beaked, ribbed. Pappus copious, the hairs white, slender, usually with a ring of very short hairs at the base. (Ancient Latin name of the lettuce.)

Species about 10 in the north temperate region, 3 in the Philippines, the following introduced and cultivated.

* 1. L. SATIVA L. Lechuga (Sp.-Fil.); Lettuce.

An erect, usually simple, annual, glabrous herb reaching a height of 1 m. Leaves 6 to 20 cm long, obovate to oblong-obovate, entire or lobed, toothed, thin, the basal ones numerous. Heads numerous about 1 cm long, in open panicles, the branches often with much reduced, bract-like leaves. Flowers yellow.

Extensively cultivated for the local markets, occasionally flowering; not spontaneous. A native of Europe, now cultivated in all warm countries.

25. SONCHUS Linnaeus

Annual or perennial, erect herbs with milky juice. Leaves alternate, those of the stem often clasping, toothed or pinnatifid, segments often spinulose-toothed. Heads in lax, subcorymbose panicles, yellow. Flowers all ligulate. Involucre cylindric to campanulate, the bracts several-seriate, the outer ones shorter; receptacle naked. Achenes ovoid to ellipsoid, compressed, not beaked, the ribs smooth or wrinkled; pappus white, the hairs very numerous, slender. (The ancient Greek name for some species.)

Species about 25, in the north temperate region, few in tropical countries, 2 introduced in the Philippines.

1. S. OLERACEUS L.

An erect, annual herb, pubescent or slightly glandular, 40 to 60 cm high, branched above. Leaves oblong to lanceolate, coarsely lyrately lobed, the lobes somewhat reflexed, spinulose-toothed, those of the stem clasping at the base, 10 to 20 cm long. Heads peduncled, about 1 cm long, the bracts glabrous, thin, green; flowers numerous, yellow. Achenes nearly 3 mm long, ribbed, rough.

Casual in disturbed or cultivated soil, fl. April–Aug., occasional in the Philippines, especially in the Mountain Province, Luzon. A native of Europe, now a widely distributed weed of cultivation.

26. CREPIS Linnaeus

Annual, glabrous or hairy, erect herbs. Leaves mostly radical and rosulate, some cauline, entire, toothed, or pinnatifid. Heads small, corymbose, yellow, flowers all homogamous and ligulate. Involucre cylindric, the outer few bracts very much smaller than the linear, 1-seriate, inner ones. Achenes small, many-ribbed, narrowed at both ends; pappus soft, white. (Ancient Greek name for some plant, from the Greek "sandal.")

Species 130 or more, mostly in the north temperate zone of the Old World, 1, probably introduced, in the Philippines.

1. C. JAPONICA (L.) Benth.

An erect, slender, annual, glabrous or slightly pubescent herb 15 to 30 cm high, stems one to several from each root. Radical leaves obovate, thin, sinuate-toothed to nearly entire, 5 to 15 cm long. Stems slender, erect, nearly leafless, corymbosely branched at the top, the branches spreading. Heads 5 to 6 mm long, the involucral bracts green.

Occasional as a weed in gardens, fl. all the year; widely distributed in the Philippines chiefly at medium altitudes in cultivated ground, etc. Widely distributed in tropical Asia, extending to Mauritius, Japan, and Malaya.

In addition to the species above considered, several representatives of the family are cultivated in Manila, from annually imported seeds, such as *Zinnia elegans* L., various horticultural forms of *Coreopsis*, a species of *Aster*, locally known as "consueldo," and some forms of *Dahlia*.

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EXPLANATION OF ABBREVIATIONS OF AUTHORS' NAMES

A. Br. - Braun, Alexander
Adans. - Adanson, Michel
A. DC. - De Candolle, Alphonse
Ait. - Aiton, William.
Ait. f.- Aiton, William Townsend
All. - Allioni, Carlo
Anders. - Andersson, Nils Johan
Andr. - Andrews, Henry C.
Andrz. - Andrzejowski, Anton Lukianowicz.
Ard. - Arduino, Pietro.
Arn. - Arnott, George A. Walker
Asch. - Ascherson, Paul
Aust. - Austin, Coe Finch.
B. & H.- Bentham, George, and Hooker, Joseph Dalton
Bab. - Babington, Charles Cardale.
Baill - Baillon, Henri Ernest
Baldw. - Baldwin, William
Barn. -Barneoud, F. Marius
Bartl. - Bartram, William
Beauv. - Beauvois, A. M. F. J. Palisot de.
Benn. - Bennett, Arthur
Benth. - Bentham, George
Bernh. - Bernhardi, Johann Jacob
Bess. - Besser, Wilhelm S. J. G. von.
Bieb. - Bieberstein, Friedrich August, Marschall von.
Bigel. - Bigelow, Jacob.
Bjornstr.Bjornstrom, Friedrich Johann.
B. Juss- Jussieu, Bernard de.
Boeckl.- Boeckler, Otto.
Boenn.- Boenninghausen, C.M.F.von.

Boerh. - Boerhaave, Hermann.
Boiss. - Boissier, Edmond.
Borkh. - Borkhausen, M.B.
Br.,A.Br-Braun, Alexander.
Br.,P.Br-Browne, Patrick.
Br.,R.Br-Brown, Robert.
Brack. - Brackenridge, William D.
Briq. - Briquet, John.
BSP. - Britton, Nathaniel Lord, Sterns, E.E., and Poggenberg, Justus F.
Burm. f.-Burman, Nikolaus Laurens.
C.& S. - Chamisso, Adalbert von, and Schlechtendal, D.F.L. von.
C.A.Mey.-Meyer, Carl Anton.
Carr. - Carriere, Elie Abel.
Casp. - Caspary, Robert.
Cass. - Cassini, Henri.
Cav. - Cavanilles, Antonio Jose.
Celak.- Celakovsky, Ladislav.
Cerv. - Cervantes, Vicente.
Cham. - Chamisso, Adalbert von.
Chapm.- Chapman, Alvan, Wentworth.
Chois - Choisy, Jacques-Denis.
Clayt.- Clayton, John.
Coult.- Coulter, John Merle.
Cyrill.- Cirillo, Domenico.
Darl. - Darlington, William.
Davenp.- Davenport, George Edward.
DC. - De Candolle, Augustin Pyramus.
DC.,A.DC.De Candolle, Alphonse.
Dcne.- Decaisne, Joseph.
Desf. - Desfontaines, Rene Louiche.
Desr. - Desrousseaux.
Desv. - Desvaux, Augustin Nicaise.
Dietr.- Dietrich, Albert.
Dill - Dillenius, Johann Jacob.
Dougl.- Douglas, David
Dufr. - Dufresne, Pierre.
Duham.- Du Hamel du Monceau, H.L.
Dumont.- Du Mont de Courset, G.L.M.

Dumort. - Dumortier, Barthelemy C.
Dur. - Durieu de Maisonneuve.
Eat. - Eaton, Amos.
Ehrh. - Ehrhart, Friedrich.
Ell.. - Elliot, Stephen.
Endl. - Endlicher, Stephan Ladislaus.
Engelm.- Engelmann, George.
Esch. - Eschscholtz, Johann Friedrich.
Fisch.- Fischer, F.E. Ludwig von.
Forst. - Forster, J. R. and George.
Foug. - Fougeroux, Auguste, Denis.
Fourn. - Fournier, Eugene.
Fresn. - Fresenius, J.R.G.W.
Froel. - Froelich, Joseph Aloys.
Gaertn.- Gaertner, Joseph.
Gal. - Galeotti, Henri.
Gaud.- Gaudichaud-Beaupre, Charles
G.F.W.Mey-Meyer, George Friedrich Wilhelm.
Gilib. - Gilibert, Jean Emmanuel.
Gmel. - Gmelin, Samuel Gottlieb.
Gmel., J.F.Gmel.- Gmelin, Johann Friedrich.
GMEL., J.G.Gmel.- Gmelin, Johann Gorge.
Godr.- Godron, Dominique, Alexander.
Good.- Goodenough, Samuel.
Grab.- Grabowski, Heinrich Emanuel.
Graebn.- Graebner, Paul.
Gren.- Grenier, Charles.
Grev. Greville, Robert Kaye.
Grieseb.- Grisebach, Heinrich R.A.
Gronov. Gronovius, Jan Fredrik.
Gunn.- Gunnerus, Johann Ernst.
Guss.- Gussoni, Giovanni.
H.& A.- Hooker, William Jackson, and Arnott, G.A.Walker.
Hack.- Hackel, Eduard.
Hartm.- Hartman, Carl Johan.
Hassk.- Hasskarl, Justus Carl.
Haussk.-Haussknecht, Carl.

Haw - Hawort, Adrian Hardy
HBK. - Humboldt, F., Alexander von,
Bonpland, Aime, and Kunth, C.S.
Hegel- Hegelmaier, Friedrich.
Heist- Heister, Lorentz.
Herb.- Herbert, William
Hitchc.Hitcock, Albert Spear.
Hoffm.-Hoffmann, George Franz.
Hook- Hooker, William Jackson.
Hook f.Hooker, Joseph Dalton.
Hornem-Hornemann, Jens Wilken.
Huds. -Hudson, William
Jacq.- Jacquin, Nicolaus Joseph.
J.D.Sm.-Smith, John Donnell.
J.F.Gmel.- Gmelin, Johann Friedrich.
J.G.Gmel.- Gmelin Johann George.
J. Sm.- Smith John.
Jord.- Jordan, Alexis.
Juss.- Jussieu, Antoine Laurent de.
Juss. B. Juss.- Jussieu, Bernard de.
Karst.- Karsten, Hermann.
Krock.- Krocker, Anton Johann.
Ktz. - Kuntze, Otto.
L. - Linnaeus, Carolus, or Linné,
Carl von.
L.f.- Linné, Carl von (the son).
Laestad.- Laestadius, Lars Levi.
Lag.- Lagasca, Mariano.
Lall.- Ave.-Lallemant, J.L.E.
Lam. Lamarck. J.B.A.P. Monnet.
Lat.- Latourette, M.A.L.
Leavenw.- Leavenworth, Melines C.
Ledeb.- Ledebour, Carl F. von.
Lehm.- Lehmann, J.G.C.
Lesp.& Thev. Lespinasse, Gustave,
and Theveneau, A.
Less.- Lessing, Christian Friedrich.
L'Her.- L'Heritier de Brutelle, C.L.
Lightf.- Lightfoot, John.
Lindl.- Lindley, John.

Lodd.- Loddiges, Conrad.
Loefl.- Loefling, Pehr.
Loisel.- Loiseleur-Deslongchamps,
J.L.A.
Loud.- Loudon, John Claudius.
Lour.- Loureiro, Juan.
Mac M.- MacMillan, Conway.
Marsh.- Marshall, Humphrey.
Maxim.- Maximowicz, Carl Johann.
Medic.-Medicus, Friedrich Casimir.
Meisn.- Meisner, Carl Friedrich.
Merr.- Merrill, Elmer D.
Mett.- Mettenius, Georg Heinrich.
Mey.- Meyer, Ernst Heinrich F.
Mey., C.A.Mey.- Meyer, Carl Anton.
Mey., G.F.W.Mey.- Meyer, Georg
Friedrich Wilhelm.
Mich.- Micheli, Pier'Antonio.
Michx.- Michaux, Andre.
Michx.f. Michaux, Francois Andre.
Mill.- Miller.- Philip.
Moq.- Moquin-Tandon, Alfred.
Muell.Arg.- Mueller, Jean(of aargau).
Muench.- Muenchhausen, Otto Freiherr
von.
Muhl.- Muhlenberg, G.H.E.
Murr.- Murray, Johann Andreas.
Neck.- Necker, Noel Joseph de.
Nees.- Ness von Esenbeck, Christian
Gottfried.
Nees & Eberm.- Nees von Esenbeck, T
F.L., and Ebermaier, K.H.
Newm.- Newman, Edward.
Nutt.- Nuttall, Thomas.
Pall.- Pallas, Peter Simon.
Parl.- Parlatore, Filippo.
P. Br.- Browne, Patrick.
Pers.- Person, Christian Hendrick.
Peterm.- Petermann, Wilhelm Ludwig.
Planch.- Planchon, Jules Emile.
Plum.- Plumier, Charles.
Poir.- Poiret, Jean Louis Marie.

Poll.- Pollich, Johann Adam.
R. & P.- Ruiz Lopez, Hipolito, and Pavon, Josef.
R. & S.- Roemer, J.J., and Schultes, August.
Raf.- Rafinesque-Schmaltz, C.S.
R. Br. Brown, Robert,
Reichenb.- REICHENBACH, H.G.L.
Retz.- Retzius, Anders Johan.
Richards.- Richardson, John.
Roem.- Roemer, M. J.
Rostk.- Rostkovius, F.W.G.
Rottb.- Rottboell, Christen Fries.
Rupp.- Ruppius, Heinrich Bernhard.
Rupr.- Ruprecht, Franz J.
Rydb.- Rydberg, Per Axel.
Salisb.- Salisbury, Richard Anthony.
Sarg.- Sargent, Charles Sprague.
Sch.Bip.- Schultz, Karl Heinrich (distinguished as Bipontinus, i.e. of Zweibrucken).
Schleich.- Schleicher, J.C.
Schleid.- Schleiden, Matthias Jacob.
Schrad.- Schrader, Heinrich Adolph.
Schreb.- Schreber, Johann D.C.von.
Schwein.- Schweinitz, Lewis David de.
Scop.- Scopoli, Johann Anton.
Scribn.- Lamson-Scribner, Frank.
Ser.- Seringe, Nicolas Charles.
Shuttlw.- Shuttleworth, Robert.
Sibth.- Sibthorp, John.
Sieb.& Zucc.- Siebold, P.F.von, and Zuccarini, J. G.
Sm.- Smith, James Edward.
Sm., J.Sm.- Smith John.
Sm., J.D.Sm.- Smith, John Donnell.
Sm., J.G.Sm.- Smith, Jared Gage.
Soland.- Solander, Daniel.
Spreng.- Sprengel, Kurt.
Sternb.- Sternberg, Caspar.

Steud.- Steudel, Ernst Gottlieb.
Stev.- Steven, Christian.
St. Hil.- St. Hilaire, Augusto de.
Sulliv.- Sullivant, William Starling.
Sw.- Swart, Olaf.
T. & G.- Torrey, John and Gray, Asa.
Thunb.- Thunberg, Carl Pehr.
Torr.- Torrey, John.
Tourn.- Tournefort, Joseph Pitton de.
Trel.- Trelease, William.
Trev.- Treviranus, Christian Ludolf.
Trin.- Trinius, Karl Bernhard.
Tuckerm.- Tuckerman, Edward.
Turcz.- Turczaninow, Nicolaus.
Underw.- Underwood, Lucien Marcus.
Vaill.- Vaillant, Sebastien.
Vent.- Ventenat, Etienne Pierre.
Vill.- Villars, Dominique.
Wahlb.- Walhlberg, Pehr Fredrik.
Wahlenb.- Wahlenberg, Georg.
Waldst.& Kit.-Waldstein, F.A. von,
and Kitaibel, P.
Wallr.- Wallroth, K.F.W.
Walp.- Walpers, Wilhelm Gerhard.
Walt.- Walter, Thomas.
Wang.- Wangenheim, F.A.J.von,
Wats.-Watson, Serene.
Wettst.- Wettstein, Richard von.
Willd.- Wildenow, Carl Ludwig.
Wimm.- Wimmer, Friedrich.
With.- Withering, William.
Wormsk.- Wormskiold, M. von.
Wulf.- Wulfen Franz Xavier.

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